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3

PROCEEDINGS

OF

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CONTENTS.

PAGE.
OFFICERS OF THE CANADIAN INSTITUTE, 1886-7 iii
PRESIDENTS SINCE 1849 iv
LIST OF MEMBERS 265
LIST OF EXCHANGES ....

PAPERS.

I.—PRESIDENT'S ADDRESS.
W. H. VanderSmissen, M.A. 2

II.—RELATIONS BETWEEN PHYSIOLOGY AND PSYCHOLOGY.
W. F. W. Creelman, B.A. 14

III.—MORTUARY CUSTOMS OF THE BLACKFEET INDIANS.
Rev. John McLean, B.A. 20

IV.—SCIENTIFIC AND PEDAGOGIC CLAIMS OF SOCIOLOGY.
W. Houston, M.A. 25

V.—A NEW PLANIMETER.
C. Fessenden, B.A 27

VI.—CANADIAN APATITE.
F. T. Shutt, M.A., F.C.S 30

VII.—NOTES ON REICHERT'S DISTILLATION PROCESS FOR THE IDENTIFICATION OF BUTTER-FAT.
A. McGill, B.A., B. Sc 39

VIII.—JURISPRUDENCE OF INSANITY.
D. A. O'Sullivan, D.C.L. 44

IX.—CONTRIBUTIONS TO BLOW-PIPE ANALYSIS.
H. R. Wood, B.A. 56

X.—RELATIONSHIP OF THE AMERICAN LANGUAGES.
A. F. Chamberlain, B.A. 57

XI.—LANGUAGE AND LITERATURE OF BRITTANY.
Rev. Dr. MacNish 76

XII.—THE ETRUSCAN QUESTION.
Rev. Prof. Ferguson 84

XIII.—COREA.
Arthur Görgenyi 105

XIV.—DUPLEX TELEPHONY.
Dr. Rosebrugh 106

XV.—BAROMETRIC PRESSURES.
R. F. Stupart 111

XVI.—MAMMALS AND BIRDS OF PRINCE OF WALES SOUND, HUDSON'S STRAIT.
F. F. Payne 111

XVII.—CHEMISTRY OF THE NATURAL WATERS OF ONTARIO.
Dr. Ellis. 123

XVIII.—SOME STONE IMPLEMENTS FROM LAKE ST. JOHN, QUE.
Dr. Daniel Wilson. 124

XIX.—THEORIES OF HEREDITY.
A. B. Macallum, B.A. 124

XX.—GEOLOGY IN THE PUBLIC SCHOOLS.
James T. B. Ives, F.G.S. 125

XXI.—THE QUICHUA LANGUAGE.
Prof. Dunlop 130

XXII.—THE ALASKAN BOUNDARY.
T. B. Browning, M.A. 132

XXIII.—CANADA IN SCULPTURE.
Rev. Dr. Scadding 132

XXIV.—DEXTRINE-MALTOSE IN BEER WORTS.
C. Gordon Richardson 133

XXV.—ANTAGONISM OF SOCIAL FORCES.
W. A. Douglass, B.A. 136

XXVI.—NECESSITY OF A SOCIETY FOR THE PREVENTION OF CRUELTY IN TORONTO.
J. J. Kelso 142

XXVII.—PRE-HISTORIC ETHNOLOGY.
A. F. Chamberlain, B.A. 144

XXVIII.—GEOLOGY OF MOUNT GREYLOCK.
Prof. T. Nelson Dale 145

XXIX.—CENTRIFUGAL FORCES OF THE PLANETS.
John Phillips 145

XXX.—NOTES ON ASTRONOMY.
J. A. Livingston 145

XXXI.—SOME PATHOLOGICAL GROWTHS IN LOWER ANIMALS.
A. B. Macallum, B.A. 146

XXXII.—REMINISCENCES OF THE HURON MISSIONS.
Rev. Father Laboureau 149

XXXIII.—DIPHTHERIA AND SCARLATINA IN THEIR VARIOUS ASPECTS.
Dr. P. H. Bryce 149
(See Report for 1886 of Provincial Board of Health.)

XXXIV.—PLACES OF GEOLOGICAL INTEREST NEAR MEDICINE HAT.
Prof. J. Hoyes Panton, M.A. 150

XXXV.—VOLUMETRIC SYSTEM IN MATERIA MEDICA.
Dr. W. B. Nesbitt 163

XXXVI.—STUDY OF LANGUAGE.
Charles Hill Tout 165

XXXVII.—DIABASE DYKES OF RAINY LAKE.
A. C. Lawson, M.A. 173

XXXVIII.—IRON AND THE OTHER ORES OF ONTARIO.
James T. B. Ives, F.G.S 185

XXXIX.—ORIGIN OF HAEMOGLOBIN.
A. B. Macallum.......... 192

XL.—PHOTOGRAPHING THE LIVING FUNDUS OCULI.
Dr. A. M. Rosebrugh 192

XLI.—A BRAGH OR STONE FLOUR MILL.
Sheriff McKellar.......... 193

XLII.—CANADIAN WOODPECKERS.
J. B. Williams.......... 193

XLIII.—FORTUITOUS EVENTS.
Dion C. Sullivan, LL.B.......... 193

XLIV.—SOME EXPERIMENTS IN CONNECTION WITH THE DOCTRINE OF PROBABILITIES.
Alfred Baker, M.A.......... 194

XLV.—MANUFACTURE OF PAPER.
John Notman.......... 197

XLVI.—THIRTY-EIGHTH ANNUAL REPORT.
W. H. VanderSmissen, M.A.......... 206

XLVII.—TARTARIC ACID IN ADMIXTURES.
A. McGill, B.A.......... 212

XLVIII.—COLEOPTERA COLLECTED IN KICKING HORSE PASS.
Bruce Bailey.......... 213

XLIX.—INDIAN LANGUAGES AND LITERATURE.
Rev. John McLean, M.A.......... 215

L.—A NEW MENOBRANCHUS.
Dr. Garnier.......... 218

LI.—UMBRIA CAPTA.
Rev. N. MacNish, B.D., LL.D.......... 219

LII.—MINING INDUSTRIES OF CANADA.
W. H. Merritt, F.G.S.......... 240

LIII.—SNAKE POISONS.
Dr. J. H. Garnier.......... 255

PROCEEDINGS

OF

THE CANADIAN INSTITUTE,

SESSION 1886-'87.

FIRST MEETING.

First Meeting, Saturday, 6th November, 1886, the President in the Chair.

The following donations were announced to Nov. 6th, 1886:

1. Dominion Church of England Temperance Journal, Vol. I, Nos. 1-7.
2. Report of the Second Hudson's Bay Expedition, Lieut. A. R. Gordon, R.N., with Charts.
3. Report on Canadian Archives for 1885, by Douglas Brymner, Archivist.
4. Annual Report of the Superintendent, Toronto Water Works, for 1885.
5. Report of the Entomologist, Canada, 1885, James Fletcher, F.R.S.C.
6. Phenomena of Suggestion in Hypnotic Sleep, &c., by Giuseppe Seppilli, translated by Dr. Workman.
7. The Origin of Languages, by Horatio Hale.
8. Algonkin Forest and Park, by A. Kirkwood, Esq.
9. The Educational System of Ontario, 1886.
10. Quaritch's Catalogues, Nos. 367, 368, 369.
11. Edinburgh Astronomical Observations, Vol. XV., 1877-86, Star Catalogue.
12. Bergens Museums Aarsberetning, for 1885.
13. Ward's Natural Science Bulletin, May 1, 1886.
14. Appleton's Literary Bulletin, Nos. 45, 46, 48.
15. Report of Third International Geographical Congress, Venice, 1881, from G. M. Wheeler, Capt. Engineers, U. S. Army (2 copies).
16. Bibliotheca Americana, for 1886, from R. Clarke & Co., Cincinnati.
17. Powdered Anthracite and Gas Fuel, from the Lackawanna Institute.
13. Indiana Historical Society, Pamphlet No. 2.

The following summary of Exchanges since the last Annual Meeting, 1st May, 1886, was presented :—

Exchanges--America		251
"	Europe	601
"	Asia and Australasia	50
"	Africa	16
		918
Same period last year		617
Increase		301

On motion by Mr. James Bain, seconded by Mr. J. Herbert Mason, it was resolved: "That this General Meeting authorize and empower the Council to mortgage the land and premises of the Canadian Institute, situate at the corner of Richmond and Berti Streets, Toronto, for a sum not exceeding $1,000, upon such terms and conditions as to time or times of payment and rate of interest as to the Council shall seem expedient, the sum so raised to be expended by the Council in fitting up the upper story as a Museum, and in necessary additions for the use of the Institute."

On motion by Mr. J. H. Pearce, seconded by Mr. J. C. Dunlop, it was resolved: "That the President, Hon. G. W. Allan, Dr. Ellis, Prof. Wilson, Prof. R. Ramsay Wright, J. Herbert Mason, the Secretary, the Treasurer, and the mover, be a Committee for the purpose of devising ways and means for raising funds to complete the building, to report at a future meeting."

ANNUAL CONVERSAZIONE.

A Conversazione was held in the Library on the evening of Friday, 12th November, 1886, when the President, W. H. VanderSmissen, M.A., read his Inaugural Address.

After returning thanks for his election, and referring to some of his distinguished predecessors, such as Sir Wm. Logan, Gen. Sir Henry Lefroy, Rev. Dr. McCaul, and Dr. Daniel Wilson, the Address continued as follows:—

THE PRESIDENT'S ADDRESS.

The aims and object of the Canadian Institute are succinctly defined in our Constitution as "The Promotion of Pure and Applied

Science." Let us then enquire, first, why science should be promoted at all, and secondly, whether and how this Institute has been and is promoting it, and how its activity in this matter may and ought to be extended in the future. It should not be necessary, at this advanced date, and in this city, which is fond of boasting of its enlightenment and intellectuality, to defend the claims of science to public sympathy and support, but unfortunately the history of the Institute and its struggles abundantly shows this necessity. Yet nothing is more plain than that science is the greatest promoter of the material well-being, at least, of the human race. Without it no bridges can be built, no public works carried on, no increased facilities for traffic or intercommunication are possible. The musical instrument maker cannot dispense with the labours of the adept in the science of sound, which is itself founded on pure mathematical laws; the public health is directly dependent on the aid of chemistry and biology.

The application of science to practical results is, of course, impossible without pure science. Pure science is the foundation of applied science; and if the former be not properly fostered the latter will infallibly languish.

But pure science, if we except the mathematics, which rest on self-evident truths, is built upon experiment and investigation. Wherever science is cultivated, she has an army of indefatigable investigators in every portion of her wide domain, engaged in laborious and minute researches into the various manifestations and phenomena of nature in her various forms.

Investigation, however, is not in itself sufficient. Laborious Wagners may go on forever adding to the heap of our knowledge, and may catalogue them and lay them out, as Goethe said of the scientific men of his youth, in different lots and parcels, giving to each a name; the world is but little richer for such knowledge as this. This is but *knowledge;* to make it *science,* the dead bones of the heap must be clothed with living flesh and breathed upon by a life-giving spirit. The investigator, indispensable though his labours be, must be followed by the philosopher. The highest type of the scientific man must have the qualities of the poet, the maker, the creator—the very noblest powers of the intellect. What Shakespeare, Dante, Goethe are in literature, he must be in science.

Of him we may say what Goethe says of the poet, that

When nature winds her endless threads along
  The spindles, heedless how they cross or tangle,
When all created things, a jarring throng,
  In chaos intermingling, clash and jangle,
He parts them till each living fibre takes
  Its ordered place, and moves in rhythmic time,
And in the general consecration makes
  Each unit swell the symphony sublime.

He reveals to us the macrocosm, and shows us :

How all things live and work, and, ever blending,
  Weave one vast whole from Being's ample range,
How powers celestial, rising and descending,
  Their golden pitchers ceaseless interchange,
Their flight on rapture-breathing pinions winging,
From heaven to earth their genial influence bringing,
Through the wide sphere their chimes melodious ringing.

Like the archangels, he

On the floating forms of earth and sky
Stamps the fair type of thought that cannot die.

* * * * * *

Assuming then that the promotion of science, both pure and applied, is a desirable object, I shall now endeavour to show that this Institute has faithfully pursued this object in the past, and is still pursuing it in the present. With a view to investigating the question of our past activity, I have taken the trouble of examining the published "Proceedings of the Institute," from their inception in 1852, and I find that in both branches of science, in the field of the patient investigation and accumulation of facts, as well as in that of philosophical deduction and induction, the Institute, in its Journal, has a high record. Here are to be found investigations, more especially into the geology of our own country, in the labours of Sir Wm. Logan and Professor Chapman, into its archæology and philology by Prof. Wilson, Sir J. H. Lefroy, Rev. Charles Dade and others, including two native Indians, Francis Assiginack, who described the language and customs of the Ottawas, and Oronhyatekha, who treated of his own Mohawk language; in mathematical and physical science we have the brilliant papers of Professors Young and Loudon, which have attracted considerable attention; in the domain of classical archæology, Dr, McCaul contributed those remarkable interpretations of Britanno-Roman inscriptions which, even before their publication as a separate work, gained for him the position of the first English scholar in classical epigraphy.

* * * * * *

The chief use of the Journal has been to disseminate the views and investigations of our members by means of exchange among the members of the various learned societies of the world. The societies with which we are thus connected extend over the whole civilized world, including not only every country in Europe, but India, Japan, Australasia, and South and Central as well as North America. Publication in our "Proceedings" ensures a hearing for the author of a paper wherever scientific men are gathered together; and the Institute may therefore claim that it has in the past fulfilled honourably, with small means at its command, its pretensions to be an institution for "the promotion of pure and applied science," as far, at least, as dissemination of knowledge is concerned. Nor has the Canadian Institute ever been narrowly local, or shown any jealousy of kindred institutions in other parts of the country. It has, on the contrary, more than once extended a helping hand to its weaker or younger sisters, and has encouraged individual workers in all parts of Canada to come forward with the results of their investigations. Thus, in the columns of the *Canadian Journal*, there were published in 1855 the proceedings of the Quebec Literary and Historical Society and of the Montreal Natural History Society, though both were older societies than our own, the former established in 1834, the latter as early as 1827, or more than twenty years before the first inception of the Institute. Again, in the volumes of the Journal throughout will be found papers contributed from all parts of Ontario, as well as from the neighbouring province. So far as the promotion of pure science, then, is concerned, it may safely be asserted that the Institute has done its fair share. How stands the matter with regard to applied science, the handmaid through whom pure science confers her most immediate benefits on mankind?

A further enquiry into the past history of the Institute will show, as to this point, that the members, individually and collectively, have constantly been alive to all questions of public moment, whether affecting this country as a whole, or only the city in which the Institute is situated; and this most effectually in two ways, viz., (1) by the reading, discussion and subsequent publication of various memoirs or papers, and (2) by memorials presented to the Government of the province, or provinces, in support of various public institutions of a scientific character.

I.—PAPERS.

In the very first volume of the *Canadian Journal* will be found a series of able articles, copiously illustrated, on that most practical of subjects, the harbour of Toronto, by Mr. Sandford Fleming, Mr. Kivas Tully, and others. In the same volume is a paper on Toronto's water supply, a subject which has constantly engaged the attention of the Institute, and still continues to do so. Certainly no subject is of more direct importance to our fellow-citizens than this, and I am persuaded that the publication in the daily press of papers read before this Institute from time to time on this subject has been of great advantage to the civic authorities in deciding upon this vexed question, as well as on that of the disposal of our sewage. I believe that even more can and will be done in this direction, to the great benefit of the public. Continuing the examination of our past work, I find in Vol. I. again Mr. Kivas Tully suggesting plans for the improvement of our Esplanade, and Prof. Cherriman advocating, as early as 1853, the adoption of the decimal currency; in Vol. II. there appears the first geological map of Upper Canada, by Mr. (afterwards Sir) Wm. Logan, our first president; and Dr. Cottle gives an account of Canadian silk-producing moths—a subject to which the present chairman of our Biological Section, Dr. Brodie, has devoted further unwearied and valuable investigation.

In the third volume, 1855, I again find a practical paper by Dr. Bovell on the best modes of dealing with the terrible scourge of cholera, the first of a series of communications on public health which have been presented to the Institute from time to time, concluding, for the present, with the contributions of Drs. Oldright, Bryce, and Ellis. In the year 1870 a member of this Institute, Mr. Andrew Elvins, anticipated by at least two years the labours of other astronomers and meteorologists in investigating the connection of sunspots with rainfalls, as well as with other meteorological elements, and the result of his investigations seemed to hold forth some prospect of establishing such a connection between these natural phenomena as should ultimately enable the meteorologist to predict for some time beforehand extraordinarily wet or dry years with some approach to certainty. The great practical benefit of such a prediction to a country so much interested in agriculture as our own will be plain to everybody; and I call attention here to the fact of Mr. Elvins's right of priority, because it has not been properly acknowledged in all quarters. In one quarter only has such acknowledgment been made, viz.: in Prof. S. F. Baird's "Annual Record of Science and Industry" for 1871. That Miss Clerke, in her lately published "History of Astronomy," should have overlooked this matter is, perhaps, not altogether surprising; but that Prof. Norman Lockyer, whom Mr. Elvins kept constantly informed as to his investigations, should have entirely ignored his claims to priority, and have given all the honours to Mr. Meldrum, of Mauritius, is, to say the least, unpleasantly remarkable. The fact that, for some reason unknown to myself, Mr. Elvins's results were never published in the *Canadian Journal*, has no doubt been the principal cause of this want of acknowledgment. Ill-health has for many years suspended Mr. Elvins's labours, but I am glad to say that, this cause being for the present happily removed, we may look for further valuable results from their resumption.

II.—MEMORIALS.

The selections I have just presented from the subjects of Papers read before this Institute abundantly prove that the members have always been in the habit of doing a good deal of pretty hard thinking on subjects of the most practical kind, and so contributing to the solution of problems of the greatest interest to the public; and a consideration of the number and nature of Memorials presented to the Canadian and Provincial Governments by the Institute from time to time will show that they were men of action as well as of thought, who were wide enough awake to give effect to their ideas, since we find that, in every instance but one, the memorials were successful. In the decade from 1853 to 1863 alone I find no less than five of these successful memorials recorded in our "Proceedings," as follows:

1. Up to the year 1853 the magnetic observing station at Toronto had been carried on at the expense of the Imperial Government, and under the direction of officers of the Royal Artillery. In this year, however, the observatory was about to be discontinued. Capt. (now

Gen. Sir Henry) Lefroy, at the time president of the Institute, was recalled, and the removal of the instruments had, I believe, already been begun, when the Council of the Canadian Institute came forward and represented to the Canadian Government the great loss which the country would sustain by the discontinuance of this long established observing station, urging its retention as a provincial institution, the purchase of such instruments as had not already been removed and of additional apparatus, and the extension of the station for meteorological purposes. All this was acceded to by the Government of the day, and the outgrowth of it is our present efficient Observatory in the Queen's Park.

2. In 1856, when the discontinuance of the Geological survey was contemplated, the Institute again memorialized the Government for its continuance as a permanent organization, and again its advice was not only listened to with respect, but followed in full.

3. In the following year, 1857, Professor Kingston presented before the Institute a scheme for utilizing the telegraph system of the country for the foretelling of storms, which was the foreshadowing of the present signal service. The Institute gave instant adhesion and support to his scheme by urging its adoption upon the Government, and it was adopted. With its present working and value every reader of the morning papers is familiar.

4. In the same year the Institute, with the same success, urged upon the Government the establishment of the .Astronomical Observatory at Quebec, thus showing that it was truly Canadian, and watchful of the interests of science in every part of the country.

5. Early in the year 1862, the Institute urged upon the Government a proper representation of Canada at the Great Exhibition of that year, and again with success.

6. The recent memoirs of Mr. Sandford Fleming on the adoption of a system of uniform time were not merely allowed to repose in the receptacle of the Journal, but the Institute took immediate steps to bring this matter, through the medium of our then Governor-General, the Marquis of Lorne, and the Canadian and Imperial authorities, before the notice of the various Governments of Europe and America, and the principal learned societies in those countries. The practical value and importance of Mr. Fleming's suggestions were at once recognized in many quarters. Thus, in Spain, the officer who had

been delegated by the Government to devise some system of uniform time for the purposes of navigation presented a translation of this memoir as a complete solution of the difficulty. On this continent the adoption by American railway systems of the standard time belts, with the practical convenience of which every traveller is familiar, is largely the result of these papers, and I feel that we may with confidence look forward to the ultimate adoption ere long of the greater scheme of uniform time for the world.

7. In the course of last year a deputation, appointed by our Council, waited upon the Government of Ontario, and urged upon them the desirability of protecting such monuments of prehistoric times as are still to be found within the provincial boundaries, as, for instance, the mounds on Rainy River and others, and of encouraging and assisting in the collection and preservation of the fast vanishing relics of the Red Man. I cannot say of this application, as I did of the others, that it has as yet borne fruit; but let us hope that the next President may be able to record its complete success.

I trust that the foregoing sketch of the past history of the Institute will have sufficiently established its claim to have done good work for the promotion of pure and applied science, as well as the direct and indirect benefits conferred on the public by this work. I come next to the question of our present condition, and in the first place let me say that there is great reason for congratulation. The attendance at the meetings and the interest taken in the various subjects under discussion show a considerable and steady progress. The number and character of the papers read during the last session are highly satisfactory, and the prospects for the ensuing session very encouraging. Even at this early date the number of papers promised will more than fill every evening, and it may be confidently affirmed that our published "Proceedings" will be more varied in range of subjects, and perhaps more thorough in character, than ever before. The accession of new blood by the incorporation of the Natural History Society has already produced greater activity and enthusiasm in our institution. The creation of the new class of associates, consisting of young men, for the most part earning their daily bread in mechanical and commercial pursuits, is another pleasing feature which cannot fail to be of benefit to the youth of this city. The membership, though not largely increased, at least yields a larger income in proportion to its apparent extent than was the case in former years. The balance sheet has at the first glance a pleasant look, since income and expenditure are duly equalized, and our assets are greatly in excess of our liabilities. But let us enquire more closely into the last item. Has our expenditure been what it ought to have been, so as to promote to the limit of our obligations the interests of pure and applied science? It is true that our financial condition is better than it was five or six years ago; but is it as good as it can and ought to be made? In order to answer this question, let us recur again to the means by which a scientific institution ought to promote the cause of science, and inquire whether in any department we have been cramped so as to impair our efficiency. These means of aiding science may be arranged under four heads, viz.:—1. The Published "Proceedings;" 2. The Library; 3. The Museum; 4. Public Lectures. Let us consider each of these items by itself:

I.—THE PROCEEDINGS.

The expenditure on this item forms a very large proportion of our total outlay, but it will have to be much larger in the future, if our deliberations are to be of any value, either to the world at large or to the investigators who contribute papers. I have dwelt above on a case in which priority of investigation on the part of one of our members has been ignored through failure of publication in the Journal, and it will be plain to everyone that no observer will care to contribute to a society which allows a year or more to elapse before the results of his investigations are sent forth to the world. Publication, however, is a costly thing, especially prompt publication; the cost will increase with the number and importance of our communications, and the Government grant to the institution for this purpose is even now no longer equal to what ought to be our expenditure.

II.—THE LIBRARY.

The Council has long since wisely abandoned the attempt to create a scientific library by the purchase of works as they are issued from the press, and our present efforts are confined to the incorporation in the library of the transactions of scientific societies which we receive in exchange for our "Proceedings." These, regularly bound, form a consulting library in every branch of science of inestimable value to the student; but the large increase in the number of our exchanges, to which I have called attention above, renders the cost of binding much heavier than before, and is a new and heavy drain upon our limited resources.

III.—THE MUSEUM.

The educational value of public museums is so evident that I need not enlarge upon it. In the past history of the Institute many valuable and interesting specimens have been presented to its museum, both biological and archæological, but a great portion has disappeared, simply because we have been too poor to house them. At the present juncture there are awaiting us renewed gifts of very great value, which may be lost to the Institute and public for the same reason, unless vigorous measures are at once adopted. Some provision we have already made in this direction, and some further provision can be made without seriously increasing the load of our obligations. But if our museum is to be one worth visiting, it should have an income independent of that derived from members' fees. The mere collection of specimens, I may add, does not fulfil all the needs of a good biological museum. It should be supplemented by the purchase of a microscope of the best pattern and highest powers. Such an instrument, available to public use, is not to be found in the city of Toronto; yet it is indispensable for the purposes of applied biology and chemistry, for the proper examination of organic bodies, and for the study of disease germs. The cost of such a microscope is about $500. I am happy to be able to state that, through the efforts of Mr. J. H. Pearce, one of our most active members, the sum of $60 for this object has already been collected.

IV.—PUBLIC LECTURES.

The inestimable value of free courses of public lectures, particularly to young men engaged in winning their bread by laborious toil, hardly needs a word of comment. Why should we not have such courses in Toronto as the Somerville lectures, for instance, at Montreal, held in connection with the Montreal Natural History Society? The Canadian Institute would be only too glad to provide this kind of public instruction. But again the answer is: "No funds!" Omitting the cost of publication, which we may fairly expect to defray from our present resources, our needs may be summed up as follows:—

1. The finishing of the library, and increased income for necessary expenses of binding, &c., connected therewith.

2. The fitting up of a museum, and a sufficient annual income to allow of the continuous purchase of specimens. The former we can accomplish, for present needs only, by fitting up the third storey at a cost of about $1,000; but it is highly desirable that we should be able to build an addition in the rear, where the museum would be less cramped and more accessible. For its proper maintenance we require an additional income of at least $500 per annum.

3. The endowment of courses of public lectures, and the building of a large lecture-room, fitted up with the proper apparatus. The sum required for this will be large: the proposed lecture hall would cost from $4,000 to $5,000, and a considerable annual expenditure would be necessary.

I think it will be evident from what I have just said that we are still, in spite of the improvement in our financial condition, much cramped in our promotion of science from want of adequate means.

The remainder of the address was taken up with suggestions, (1) as to possible sources of increased revenue in the future, (2) as to the extension of the influence of the Canadian Institute by the formation of branch societies in other parts of the province, and the affiliation of the various scientific associations among the students of University College.

SECOND MEETING.

Second Meeting, Saturday, 13th November, 1886, the President in the Chair.

Exchanges since last meeting, 42.

The following donations of Eskimo implements, dresses, and other objects of interest from Prince of Wales' Sound, by F. F. Payne, Esq., were announced:

1 Cannon found on the shore of Prince of Wales' Sound.
2 Model Kayaks.
1 Stone Lamp.
1 Stone Kettle.
1 Woman's Dress.
2 Men's Coats.

1 Boy's Coat.
1 Pair of Trunk-hose.
1 Arctic Fox Skin.
1 Coil of Rope.
2 Pairs of Boots.
1 Duck Spear.
2 Whalebone Duck Traps.
1 Snow Shovel.
1 Pair of Snow Goggles.
1 Pair of Deerskin Mitts.
1 Eskimo Snow Knife, used in building houses.
1 Snow Duster, a stick carried by women to knock the snow off men's dresses.
1 Ivory Set of Eskimo Dominos.
1 Powder Measure, 1 Harpseal Skin, 2 Thimbles, and some small ornaments.

By Lieut. A. R. Gordon, R. N.:
A Sleeping Bag from Hudson's Bay.

By H. S. Howell, Galt:
A large Photograph of the keys of the Bastille, Paris.

By Prof. R. Ramsay Wright:
A Lamp.

By the President:
A Reading Desk.

Moved by Mr. Shutt, seconded by Mr. Elvins, and carried: That the thanks of the Institute be tendered to Messrs. Payne, Gordon, and the other donors for their valuable gifts to the Institute.

The following were elected members:—C. F. Durand, B.A., I. E. Martin, B. A., F. F. Payne, E. J. Kendall, G. B. Abrey, C. E., Benjamin Bayliss, jun., J. Robinson, M. D., Rev. Prof. Ferguson, William Burns, B.A., C. Fessenden, B.A., Horatio Hale, H. S. Howell, Prof. J. Hoyes Panton, Rev. John McLean, B.A., John Seath, B.A., Hugh Neilson, J. T. B. Ives, F. G. S.

Moved by Dr. Kennedy, seconded by Mr. Alan Macdougall, and carried: That a vote of thanks be tendered to the President for his interesting and instructive inaugural address delivered last night at the Conversazione, and that that part of the address containing suggestions for new sources of income be referred to the Committee on Ways and Means appointed at the last meeting, and that the other suggestions of said address be referred to the Council.

Mr. W. F. W. Creelman, B.A., read a paper on "The Relations between Physiology and Psychology," of which the following is an abstract :—

The object of this paper is not the inculcation of any new theory, or of any definite theory, with regard to the relation that might be supposed to exist between what are ordinarily called Mind and Body, but rather a brief explanation of the course Philosophy has taken of late in the investigation of that relation, or of the general question as to whether any such relation in reality exists.

The question, from the point of view from which it is here considered, may be said to have recently arisen. Its importance was indeed recognized by the astute and polymathic Aristotle; but his investigations were crude, and neither they nor those of the thinkers and investigators of many succeeding centuries throw any light upon the problem as it is now understood in England, Scotland, France, Germany and America.

The advance in the study of the relation between Mind and Body has been one from abstract to concrete; from a study of the two sets of faculties (if we may so speak), commonly called mental and physical, as if those two sets of faculties were entirely independent, and should be treated as independent, to a study of them as exhibiting dependent, connected construction, and as throwing light upon one another mutually.

The four various theories which have been held with regard to the relation between the sciences which deal with the phenomena of Mind and Body respectively are set out in a work on "Mind and Body," by Prof. Alex. Bain, whose whole philosophy may be said to be the elaboration of a fifth position, that "a knowledge of the bodily workings has already improved our knowledge of the mental workings, and as the researches are further continued, will do so more and more."

That there is some mutual co-operation between the two natures—mental and physical—can now be assumed without argument. How intimate is the mutuality found to be ?

It must be remembered that the brain is not the only substance having connection with mental functions. The entire bodily system shows such connection, though "in varying degrees."

The proof derived from the facts showing the completeness of the connection between the two natures is overwhelming. Bodily changes affect mental states; the condition of the stomach, the brain, or the nervous system shows its effects in the mental tone or condition, and affects not only the sensational part of man, but also the emotional, the moral and the æsthetic. And mental changes in their turn react upon the whole bodily organism; sorrow and fear show their effect no less upon the nervous system than upon digestion.

How readily do our emotions express themselves! And how close is the connection between them and their expression! Darwin tells us that they are so closely connected with their expression, that they hardly exist if the body remain passive.

And does not the capacity for thought, the rapidity or sluggishness of thought, depend upon both the quantity and the quality of the blood supplied to the brain? And does there not here display itself the dependence of our higher life upon the healthy tone of the stomach, and of the purifying and other organs connected with it?

Lengthened reference cannot now be made to the light thrown upon this question by investigations into disease and lunacy. Physicians now deal with Mind and Body as a practical unity. They are, avowedly or not, materialists.

The Mind is ordinarily dealt with as having a three-fold aspect—Feeling, Will and Thought—the mental trinity in unity. A separate consideration of these shows clearly their dependence upon bodily conditions and organisms.

The direct dependence of Feeling, and of feeling in its variations, upon bodily conditions and changes, need not be considered; only through the bodily medium can it be conceived as possible.

With regard to the Will, whatever may be our accepted theory with regard to the growth of volition, it is incontestable that the development, and manifestation, and direction of will, are all dependent upon bodily stimulus, acting through the nerves and nerve centres, and thence outwardly upon the organs which the will may be said to use as its instruments.

Coming to the Intellect, we find it manifesting itself in various modes, called memory, imagination, reason, etc. Might it not appear that here at least we have risen above the physical encumbrances which surround the lower manifestations? Let us briefly examine two of what the Scottish philosophers would call "faculties," and see how far memory and imagination are independent of bodily conditions and changes. The philosophers referred to treated these mental states as God-given faculties, independent altogether of bodily influence. This was the only consistent position open to them. But their theory is now but seldom heard of, except through the still small voice of Dr. McCosh, of Princeton?

What we are concerned with here is not an analysis of Memory in the abstract, but the pointing out what may be said to be an incontrovertible fact, that the commencement of acquisition, the rules of acquisition, and the use of acquisition and recollection, are all directly, if not entirely, dependent on bodily states and organisms. The content of memory is but those impressions and feelings whose existence is dependent upon nervous action, and but represents the great mass of our nervous growths and nervous combinations. When a feeling or impression is renewed, what is its seat? Beyond a doubt, the renewed feeling occupies the very same parts, and in the very same manner, as the original feeling, and no other parts, and in no other manner, that can be assigned. The seat of the memory of an impression is the seat of that impression in its origin. Thus the persistent memory of a bright color fatigues the nerves of sight. There is no one seat of memory; but each memory has its own seat, appropriate to its character. Indeed, as has been said, there is no such thing as memory, but only memories. "Every tract of nerve tissue is its own autobiographer." Memory is not, as the vague phrase of common speech has it, "in the soul"; it is fixed in its birthplace, in the nervous system. Ribot may, after all, be right in saying that a well-stored memory is but a collection of impressions and of an assemblage of "dynamic associations," very stable and very readily called forth.

The pathology of memory is interesting here, mainly as shewing how subject is memory to the fundamental conditions of life, and to the varying condition of the bodily organism. Reference may be made to the many examples given by Ribot; one of the most curious of which, in this connection, is that of a Frenchman, living in

England, who spoke English fluently, but who, receiving a blow on the head, during his illness was able to answer questions only in French.

So with Imagination. We find that imagination differs from sensation in little but the recalling of past impressions, either in the same order, or in a different order, from that in which they appeared when actually present to the senses; so that with regard to the imagination it is not necessary to recapitulate the reasons indicated for the conviction that the pictures recalled depend as much upon action of the nerves and other bodily functions, as do the contents of the faculty, so called, of memory.

The moral sphere cannot be here considered at length. But this statement may be advisedly made, that the constituents of our moral being depend almost entirely upon our bodily organism. One instance only will be given of the influence of bodily changes upon the moral character and conduct of an individual. It is that of an officer in the United States army, who during the late war was noted for his dash and bravery in many battles, but who, being once knocked down by the concussion produced by a cannon ball, became from that hour as noted for cowardice as he had formerly been for bravery, and could never again be induced to go into a battle, or to resume his military career.

The question under consideration has assumed increased importance in connection with the comparatively-new, but firmly-established doctrine of Heredity. This doctrine assumes the fact of the transmission from generation to generation of both mental and physical tendencies, and of these in conjunction with, and dependent upon, one another, handed down through a progressive development of the nervous system. To understand the possibility of improvement from age to age, we must understand, in its "subtle materialism," this principle which makes transmission possible, this principle which plays upon the nerves of men, and makes them its instrument for the storing-up of power for future use, accumulation and development. It is this which makes possible the growth of civilization from age to age, which explains that element of good or evil in man, which no surroundings, no education, can entirely eradicate or overcome. It is thus that the sins of the fathers are visited upon the children unto the third and fourth, and many generations, and thus that the doctrine of "original sin" acquires an intelligible interpretation.

A brief reference may be made to the phenomena of dreams, which have presented so puzzling a problem to thinkers of former times. Of all the absurd hypotheses framed for the explanation of subtle mental processes, none were more absurd than those framed to explain the phenomena of dreams. More light has been thrown upon them by the principle of the universal connection of the bodily organs with mental workings than by all previous theories together. In fact, without it dreams are unintelligible. Every person is familiar, in his own experience, with the stirring-up of imaginary pictures during sleep, connected with various parts of the body, and caused by disease, irritation or injury in the part interested. If the material of memory and imagination is given by bodily movement and modification, why not also that of dreams, which differs only in arrangement? If, during sleep, the falling of a poker, the rolling out of bed, the flicker of a candle before the eyelids, the sound of a voice, the smell of sulphur, or the taste of acid in the mouth, can call up, as they undoubtedly do, all sorts of clear or obscure images and scenes, why may not the whole of those images and scenes be connected with bodily organism? If sensation and nervous affection, irritation and combination, can cause so much of the content of dreams, why not all? Why seek a supernatural cause to explain what is capable of explanation by natural laws?

A few words may be allowed upon the practical importance which this question, rightly understood, assumes.

We have seen the importance of a due consideration of the relation now dealt with, in the study of medicine, and particularly in the study of lunacy. In these, rapid advance has resulted from a reversal of method, and the study of body and mind hand in hand. Hence, too, the light which has been thrown upon the question as to what has been called "moral insanity," and the wider question as to Responsibility for Crime.

We see, too, the influence of a correct theory, in this direction, upon Education. As the possibility of all education is based upon the existence of the power which the nervous system possesses of organizing conscious actions into more or less unconscious reflex operations, we see, in view of what has been said as to the influence upon the ability to acquisition, of the healthy state of the nervous system, of blood circulation, and of nutrition, how important is equal attention, in education, to health and strength of body and mind.

And we can appreciate more and more, 'from the position of a correct understanding of this relation, the influence upon health, that is, upon mental and bodily strength, of scientific sanitation, and, what may not be so manifest, its influence upon morality. The London Commissioners pointed out, a few years ago, that the tendency in the lower parts of London to gin-drinking was owing mainly to the depression of the physical system caused by impure atmosphere. The teaching and practice of temperance philanthropy are not yet sufficiently scientific.

Nothing could be of greater importance to the practical purposes of life than a just apprehension of the influence which the body exercises over the conceptions of the mind. *Orandum est ut it mens sana in corpore sano.* Happiness is the chief good of man. And the highest happiness has as its most necessary condition such a state of physical and mental health as will allow a free field for the exercise of the highest powers which we possess.

* * * * * * *

No theory is here given as to the exact relation that exists between Mind and Body. What it has been attempted to urge and illustrate is, that the mind and body can only be thoroughly understood when studied together, as correlatives or complements, and that Psychology and Physiology can only surely advance when they advance hand in hand.

There is not room here to trace the history of the growth of the recognition of some connection between mind and body, however variously dealt with and explained, from its first crude acknowledgment down to the later developments, which have been in the direction of materialism, though a modified materialism, somewhat short of the position which one writer says is the prevailing one, that mind and matter, the two sets of properties, are but one substance with two sides—a double-faced unity.

Materialism came as a reaction wherever it appeared. And reactions run to extremes. Locke's doubt as to the materiality of the soul, while it woke Kant from his "dogmatic slumber," and thus produced the most profound system of philosophy yet elaborated, on the other hand drove Hume to speak of "that little purturbation of the brain which we call thought." In France, as a reaction, came, among many, La Mettrie, with his clever and vivacious work on "Man a Machine," in which an attempt was made to explain the workings of the human mind on principles similar to those involved in the mechanism of clock-work. And in Germany, where transcendentalism soared to its loftiest heights, materialism fell the lowest, so that Hartmann can calmly say that "Man is what he eats."

But these positions have been extremes. Between them there have been the many who recognize that materialism cannot be ignored, and that the mind and body must be studied together that either may be perfectly known. And where formerly the teaching of philosophy began with the abstract consideration of the mental "faculties," or powers, the basis is now laid in a knowledge of those physiological conditions which render all knowledge possible, and which furnish the material of all we know.

Some writer has well characterized the later tendencies in this direction in the statement, that while the problems which presented themselves to Hartley and Priestly, to Berkeley and Hume, are the same which present themselves to Bain and Calderwood, to Darwin and Spencer, yet they present themselves to the latter in the light of an advanced physiology.

The President, on behalf of Rev. John McLean, B.A., Fort McLeod, Alberta, N.W.T., read the following paper on

THE MORTUARY CUSTOMS OF THE BLACKFEET INDIANS.

The Blackfoot Confederacy comprises three tribes, Bloods, Piegans and Blackfeet proper. Though now separated by means of different reservations, their customs and language are the same, the latter having a few dialectic differences. By studying the mortuary customs of one tribe, we learn those belonging to the confederacy, but in order to secure uniformity, our studies must have reference to the time preceding the overpowering influences of the civilization of the white man.

Three modes of burial have been practised by these Indians: platform or tree burial, lodge or house mode, and underground.

In the tree mode of burial a large tree of suitable proportions and location is selected, and the body is placed in one of its crotches, safely lodged from the depredations of wild animals, the covering of the corpse protecting it from the ravages of carnivorous birds.

On the plains the platform method is adopted through scarcity of timber, and even when in the vicinity of the timber patches that line the rivers, many prefer platforms to trees, this preference arising, no doubt, from long usage.

The platform method consists of four posts firmly placed in the ground, at a sufficient distance from each other to make a suitable platform upon the top as a receptacle for the corpse. The posts are from eight to twelve feet high. The body being properly prepared for burial is laid on this platform, and beside it the prized treasures of the deceased, together with the gifts of friends.

When a chief or notable warrior dies, a lodge is placed on an eminence or secluded spot, and the influential leader of his people is honoured with this conspicuous style of burial. As the buffalo-skin lodges are no longer in existence, many of the people are erecting small log buildings over the remains of their relatives, and these are used indiscriminately for young and old, male and female. Since the advent of religious teachers, the underground mode of burial is being resorted to, and although this detracts from the fascinations of Indian life for the students of American antiquities, it is preferable for the advancement of the red race. Button Chief, a famous Blood Indian chief, although adhering strongly to the principles of Christianity, said to his friends before his death: "Bury me not in the ground like a white man, I am an Indian. Lay me down as an Indian warrior, and there let me rest."

As soon as a person dies, the females in attendance upon the relatives begin to wail bitterly, and such is the grief of the female portion of friends and relatives that it is very difficult to obtain the body for burial. One or two blankets spread on the ground form the Indian's bed, and just as the deceased lies there, is he prepared for burial. Having been properly arranged, two or three blankets are used as a covering, which, being strongly tied or sewn together, constitute the Indian's coffin. Within the past few years, wooden coffins are being used, although the majority of the people adhere to the Indian mode of arranging the body in death. Well do I remember when nothing but buffalo robes were used for this purpose, and buffalo-skin lodges were extensively employed for Indian burial. When all the arrangements are completed, the corpse is placed on a *travaille*, the mourners proceed to the grave without any order of procession, the men, women, and children groaning deeply on account of their sorrow. The near relatives cry aloud plaintively, the burden of their funeral wail being the calling upon the deceased by name to return to his home and friends.

In former years horses were killed at the graves of warriors, that their spirits might follow their masters to the hunting grounds beyond; now the religious conservative spirit must yield to poverty and other influences, and the mourners are contented with cutting a part of the hair from the forelock, mane and tail of the favourite horses, and depositing it in the grave. The female relations cut their hair short, lacerate their legs and cut off a finger. The female attendants take the bereaved females, place the hand on a block of wood, lay a knife upon the finger, and with one blow from a deer's horn scraper or other instrument sever it by the first joint. The front parts of both legs from the foot to the knee are then cut with a knife until the blood trickles down and covers the front parts of the legs. No bandages are put on these, nature evidently aiding when art is discarded. A small piece of wood is placed in the palm of the hand having the severed finger, and this serves to keep it in position, after which ashes are sprinkled upon it. Sometimes the relations will visit the homes of their friends, and amid their wailing will go around the lodge kissing the females who weep with them. For several weeks after the funeral, the women go out to the grave at sunset, and again at sunrise, and continue their wailing. Should any persons die while the Indians are travelling and be buried a long distance from home, in after years when passing the grave the female relations will spend some time mourning their loss. The Indians move their camp when anyone dies. After erecting log buildings they kept up this custom and tore down their houses, rebuilding them in some other part of the reserve. Living as they have done for some time in lodges, they still move their lodges when their friends die. This arises from their dread of spirits. This custom has decided physical benefits, as it secures pure air, mental relaxation and exercise. These mourning customs exhibit many pleasant traits of character, and though not at all inviting to persons of refinement, they are none the less interesting and worthy of study, if we would understand the social customs and native religion of these people. We learn something concerning the *native religious belief* of the Blackfeet from a proper study of their mortuary customs.

Their home of the spirits is the sand hills. A dying Indian will say: "*Nitakitupo sputsikwi*—I am going to die," literally "I am going to the sand hills;" and the bereaved will tell their friends: "*sputsikwi etupo*—He is gone to the sand hills." They believe in the communion of spirits with each other. Their *animistic* ideas are very crude. Spirits dwell in trees, rapids, peculiar stones, and many other strange things in nature. Dreams in which friends appear are the visits of the souls of the departed. These ideas are also transferred to the gifts of friends to the dead. In the grave are placed pieces of bread, meat, newspapers, relics of the deceased, furs, blankets, &c.

Several visits have I made to *dead lodges*, which revealed to me these ideas of object-souls. Entering a lodge that had been opened, I found the corpse lying as in life, wrapped in a buffalo robe. Beside the bed were placed a tin cup, pipe and tobacco, and some pieces of buffalo meat. There were also in the lodge a trunk for travelling with, bow and arrows, an old gun, and numerous Indian trinkets. Introducing this subject among the Indians, I asked why they placed those things for the dead. "For their use," they replied. "Yes, but I have gone months and years after they were placed there, and they still remained." "My friend, you do not understand the Indian's way of thinking. These are spirits, and they live on the souls of these things; we are material, and we live on the matter of these things. When one of our friends dies, we place our gifts beside his body; the spirit of our friend returns, and he brings with him his friends from the spirit-world, and there they feast together. They take with them the souls of these things for their use." The friends of the dead take their own clothes, finger rings, and ornaments and present them as gifts to the dead. In one grave I found buried a saddle, some excellent furs, and many trinkets. In others I have seen placed utensils of all descriptions, and the hair of prized animals. Remonstrating with them at different times for placing these things there and suffering in consequence themselves, they have replied to my question as to why they did not keep them: "What shall we do with them?" "Take them home." "We dare not, they are not ours, they are *his*, and we cannot steal from him."

They are very superstitious and are afraid of the dead. In crossing dangerous streams in a boat or vehicle of which they know little, they will sing or pray. Passing the graves of their friends they will do the same. Several times have the Indians entreated me not to go home in the darkness, lest the spirits should follow me. Generally the people are restrained by fear and reverence from molesting the treasures of the dead. The pious heathen touches not these things, being sacred to the spirits, and those who are sceptical and immoral are afraid of the consequences of such a daring deed. Seldom do we hear of graves being robbed by the Indians themselves. Many adhere rigidly to their native customs, and follow the traditions of their native religion, yet gradually, and almost imperceptibly, we can notice the change that is taking place. Already when studying American antiquities have we to refer to the past few years to obtain facts to illustrate any Indian subject we may wish to discuss. It is well that this is so, if we hope for the development of the red race. Yet it is our duty to study these things with enthusiasm, for the years are not far distant when the transformation of life will be such as to hinder the lovers of science from obtaining facts illustrative of native customs among the Indians.

THIRD MEETING.

Third Meeting, 20th November, 1886, the President in the Chair.

The Committee on Ways and Means reported, recommending that a canvass be made of the leading merchants and other citizens in this city for subscriptions at an early day, with the view of raising a sum of not less than $10,000, to defray the cost of the necessary additions to the present building, and for increasing the general efficiency and usefulness of the Institute, which report was, on motion by Mr. Pearce, seconded by Mr. Macdougall, received and adopted.

On motion by Mr. Pearce, seconded by Mr. Bain, it was resolved : That the Committee appointed on the 6th November be further empowered to devise ways and means for increasing the efficiency of the Institute, and have power to add to their number.

Donations since last meeting:

From Messrs. Maisonneuve Frères, Paris:

"Traditions Indiennes du Canada Nord-Ouest, par E. Petitot."

From H. S. Howell, Galt:

"Kennett's Antiquities of Rome."

Exchanges since last meeting, 22.

The following were elected members:—J. H. McKinnon, Charles A. Walton, W. T. Jennings, C.E.

W. Houston, M.A., read a paper on "The Scientific and Pedagogic claims of Sociology," of which the following is an abstract:

After defining the terms "Science" and "Scientific," he went on to describe the scope of the term "Sociology," including under it all that relates to the association of living beings together for mutual aid. The general principle of Sociology in this sense is coöperation, as that of Biology is the struggle for existence, and that of Cosmology is conservation of energy. This definition of Sociology would include coöperative associations of the lower animals, but it is convenient to limit the term to human society, and so limited it may be divided into (1) the Science of Civilization, (2) the Science of Government, (3) the Science of Law, (4) the Science of International Comity, (5) the Science of Material Prosperity, and (6) the Science of Language, or, in other words, into History, Politics, Jurisprudence, International Law, Political Economy and Philology. The claim of Sociology to scientific recognition rests partly on the nature of its subject-matter, its phenomena being amenable to scientific treatment; partly on the nature of the method to be employed—the inductive one; partly on the fact that its leading principles, like those of Cosmology and Biology, have been already ascertained and formulated; and partly on the further fact that it is progressive, new discoveries being made as rapidly in this as in any other field of knowledge. The researches in one branch alone, that of comparative politics, by such men as Maine, Morgan, Maclennan, Hearn and others have almost revolutionized, within the past quarter of a century, our views as to the origin and development of political institutions. The claim of Sociology to a prominent place in the curriculums of teaching institutions rests, in the first place, on its educative value as a means of culture. It brings the student into contact with some of the greatest minds of all ages; it furnishes as good a field as can be had in either Cosmology or Biology for the exercise of the observing and reasoning faculties; it gives breadth of view in matters relating to social life, and teaches toleration; and, lastly, it corrects the tendency alike to exaggerated optimism and to exaggerated pessimism. The pedagogic claim of Sociology rests, in the second place, on the practical character of the various subjects it comprises. Civilization is the result of sociological progress. Portions of its subject matter are such sociological conceptions as those connoted by the terms "family," "property," "juridical institutions," "religious institutions," "civic institutions," "international relations," "socialism," "individualism," "anarchism," "tribalism," "communism," &c. In view of the deep practical interest which the community has in these and other sociological topics, they should be dealt with pedagogically in every part of the State educational curriculum from the primary school to the university.

In answer to a question from Mr. Squair, Mr. Houston replied that the science of Sociology embraced the whole science of Law, as well as Philology and Archæology.

Mr. Kirkland asked if any general principle ran through the whole of the science.

Mr. Houston said the principle was that of coöperation for a common end, which he illustrated by examples taken from the division of labour in the production of manufactured articles.

The President remarked on the many advantages that Canada presented for the study of Sociology, as in the case of Indian languages and archæology. Many of these advantages were passing away. He advocated the necessity of a publication society, as well as other measures for the promotion of archæological research.

C. Fessenden, B.A., exhibited a new Planimeter, the joint invention of himself and Mr. Butler, C.E., and read the following paper :—

A NEW PLANIMETER.

Mechanical integrators are constructed on the assumption that if a wheel is moved over a smooth surface in the direction of its axis it will slide without revolving; if moved at right angles to its axis it will revolve without sliding, and if moved in any other direction it will both slide and revolve. For example, if it is moved a distance l in a direction making an angle O with its axis it will revolve through a distance $l \sin O$ and slide through a distance $l \cos O$.

If the wheel is perfectly turned and truly mounted this assumption is absolutely accurate; and, from experiments that have been made, it has been shown that it is possible to turn a wheel so perfectly and mount it so truly that this assumption shall be verified to within less than one-tenth of one per cent. However, even slight imperfections in the turning and mounting will lead to results far from accurate, and it is therefore of the utmost importance in the construction of instruments for mechanical integration to make the wheel as perfect as possible.

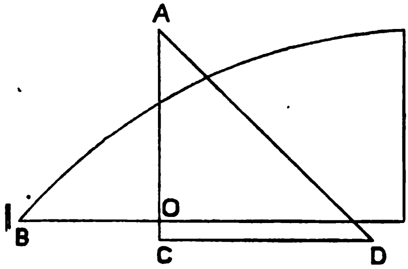
To make an instrument for integrating any quantity it is necessary and sufficient to so arrange its parts that while a tracing pointer is describing a diagram involving the independent dimensions of the quantity the wheel shall revolve through a distance which varies as this quantity.

In the case of areas and other quantities of two dimensions this has been accomplished in several ways, some exceedingly ingenious, notably so that of Prof. Amsler, whose planimeter is widely known.

Lately a planimeter has been made from designs furnished by Mr. Butler, C.E., and the writer, on a plan, so far as I know, not hitherto adopted in any mechanical integrator. Moreover the same idea may be applied in constructing instruments for integrating quantities of more than two dimensions, such as volumes of embankments, moments of inertia, total pressure of water on irregular submerged surface not horizontal, and many others.

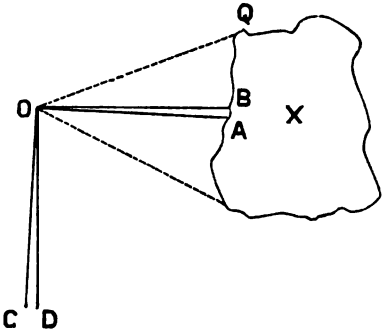
This planimeter is constructed as follows:—

A semi-parabola is arranged to slide on a right angled triangle, so that the axis of the parabola shall be always parallel to CD, one side of the triangle. A wheel is placed at B, the vertex of the parabola, with its axis in a line with that of the parabola. A tracing pointer is placed on CA, the other side of the triangle, on a slide so arranged that it shall always rest in contact with the curve. At O,



the intersection of CA with the axis of the parabola, is fixed an anchor pivot by which the triangle is anchored to the paper on which the area to be measured is plotted. The instrument is, when anchored, capable of revolving freely about O, while at the same time the parabola may be made to slide upon the triangle. By revolving the instrument and sliding the parabola the tracing pointer may be made to follow the boundary of any figure.

If the wheel is perfectly turned and mounted the sliding of the parabola will cause the wheel to slide without revolving, and the turning of the instrument about O will cause the wheel to revolve without sliding.



Let X be an area to be measured and let A and B be two positions of the tracing pointer very near together, and let C and D be the corresponding positions of the wheel. Let a be the circular measure of the angle BOA. We may suppose that the pointer is moved from A to B by revolving the instrument about O without sliding the parabola. Now while the pointer is moving from A to B the wheel revolves through the arc CD.

Measure of sector BOA = $\frac{1}{2}OA^2a$.
" " arc CD = ODa.

But from the properties of a parabola

$$OB^2 = bOD.$$

Therefore

$$\text{Measure of sector BOA} = \tfrac{1}{2}bODa,$$

while

$$\text{Measure of arc CD} = ODa.$$

Hence the distance through which the wheel revolves while the pointer is tracing the arc AB varies as the area of the sector BOA, and by suitably graduating the wheel the area of the sector BOA is registered on the wheel.

The boundary of the figure X may be considered as made up of an infinite number of infinitely small arcs having the centre O and different radii. As each arc is traced the wheel registers the area of the corresponding sector, while a change of radius causes the wheel to slide without revolving. Hence, while the tracing pointer is describing the boundary of the figure from P to Q in the direction of the hands of a watch, the wheel registers the area of the figure contained by OP, OQ, and the part of the boundary of X passed over by the tracing pointer. As the tracing pointer goes on from Q to P, the wheel revolves in the opposite direction, registering the area of the figure contained by OP, OQ, and the part of the boundary of X meanwhile traced. It is therefore easy to see that when the tracing pointer has described the whole boundary of X just once, the wheel will indicate the area of X.

Mr. G. B. Abrey exhiibted one of Amsler's Planimeters and said that the introduction of the curve of the parabola was new so far as he was aware. Other curves could be introduced, and the principle extended indefinitely. He hoped to have an instrument made that would be a practical success. He explained the theory of another form of the instrument, simpler in practice, though more complex in theory.

Mr. Macdougall called attention to a Planimeter invented by Mr. John Say, of Kirkaldy, the leading feature of which was the employment of a cone, acting on an index-wheel from which is read off the area of any figure whose outline has been followed by the tracer of the instrument. When the cone was employed as a multiplier it was easy to fix upon the proper proportions, so that the number of revolutions of the index-wheel in relation to those of the moving wheels and of the cone, being always directly in proportion to its distance from the apex of the cone, the area of the figure would be indicated. No Planimeter, however, had been vented in which the errors arising in using the instrument had been entirely got rid of, such as the retardation of the index-wheel by the compound sliding and revolving motion in the back-action.

FOURTH MEETING.

Fourth Meeting, 27th November, 1886, the President in the Chair.

Exchanges since last meeting, 45.

F. Chamberlain, B.A., and George Andrew McKinnon, were elected members.

F. T. Shutt, M.A., F.C.S., read the following paper on

CANADIAN APATITE.

Amongst the economic minerals that enrich the Dominion of Canada, Apatite (commonly known as "Phosphate") holds a prominent position.

The vast deposits of this valuable mineral, which occur in various parts of Canada, are now, and have been during the last fifteen years, extensively worked, until now phosphate mining is recognized as standing in the front rank of our mining industries. The annual "out-put" steadily increases, for while in 1875 only 3,701 tons were exported, in 1884 nearly 25,000 tons were mined. These figures go to show that this industry is fast becoming one of great commercial importance, and, considering the value of "Superphosphate" as a fertilizer, one which demands the highest scientific treatment.

The name "Apatite," derived from the Greek verb *ἀπατάω*, I deceive, was first given from the great similarity which this mineral bears to many others, *e.g.*, pyroxene, beryl, etc., it having often been mistaken for these by mineralogists and miners.

Essentially, it is a tricalcic phosphate, its chemical composition being represented by the formula $3Ca_3(PO_4)_2CaF_2$. This formula shows the presence of calcium fluoride, which in our Canadian species amounts to about 7%. In many European species this is replaced by a somewhat larger percentage of calcium chloride. This fact makes our apatite the richer in phosphoric acid of the two, as the following figures will show :—

Canadian fluor-apatite....... $3Ca_3(PO_4)_2CaF_2 \left\{ \begin{array}{ll} Ca_3(PO_4)_2 \ldots\ldots & 92.26\ \% \\ CaF_2 \ \ldots\ldots & 7.74 \end{array} \right.$

European chlor-apatite.... $3Ca_3(PO_4)CaCl_2 \left\{ \begin{array}{ll} Ca_3(PO_4)_2 \ldots\ldots & 89.32 \\ CaCl_2 \ \ldots\ldots & 10.68 \end{array} \right.$

These percentages have been calculated from the molecular formulæ.

We find, however, that a small amount of the calcium fluoride is as a rule replaced by calcium chloride, and that the percentage of tricalcic phosphate is lowered by the presence of calcium carbonate to an extent of from .05 to 5%, apparently present in thin laminæ in the cleavage planes.

The analysis of a specimen from the Templeton district, of a fair average quality, shows it to have the following composition :—

Tricalcic phosphate..................................	89.85
Calcic fluoride.....	7.90
Calcic chloride..........................	.37
Calcic carbonate.....	.49
Insoluble residue..................................	.05

Note.—The difference, 1.34%, may be partly accounted for by the presence of moisture, and partly by the presence of small quantities of alumina and magnesia not estimated in this case.

The rocks in which this mineral occurs belong to the Laurentian period. They cover a vast area both in Ontario and Quebec, overlying a district in the northern portions of these Provinces from Labrador to the Arctic Ocean, and stretching down to the St. Lawrence between Kingston and Brockville. For the most part this district is exceedingly wild and rugged, often densely wooded, though in many places overlaid by rocks of the Palæozoic Age and by glacial and post-glacial deposits, where agriculture to a greater or less extent may be pursued. The origin of these rocks (the Laurentian) is still veiled in mystery, though it is generally conceded to have been a metamorphic one. Deposited in prepalæozoic seas, in similar manner to the later stratified rocks, they are supposed to have been subjected to the agencies of subterranean heat and vapour at high pressure, and of eruptive overflows. By such treatment they have become so metamorphosed that their stratification and chemical composition alone point to their sedimentary origin and character. They are highly crystalline and often much folded and contorted, and consist of quartzite, gneiss, pyroxene and other related silicious rocks. Traversing these, however, are to be found strata or bands of crystalline limestone and dolomite—the limestone often highly coloured—together with beds of many economic minerals. These latter consist principally of iron ores, graphite and apatite. It is always in connection with these bands of limestone that the phosphate is found, and therefore they have acquired the name of the "Phosphate-bearing Rocks."

These are especially rich in the townships of Templeton, Hull, Buckingham and Wakefield (Ottawa Co.), Quebec, and North Burgess, Elmsley and adjoining townships in Ontario. These two districts are most probably, geologically speaking, one—the characteristics presented by one being recognizable in the other for the greater part. In the former district the rivers Gatineau, La Blanche and Aux Lièvres run, and in their valleys the largest deposits lie. By a reference to a map of Ottawa County it will be seen that the La Blanche at a distance of some ten miles from the Ottawa River widens into Lake McGregor, and proceeding northward we find a succession of narrowings and widenings—so typical of many of our rivers—forming a chain of connected lakes till we reach the northern boundary of Wakefield. This district is especially rich in phosphate, as is the district between the La Blanche and Aux Lièvres, where the Dominion Mining Co. and the Montreal Mining Co. have made extensive operations.

The origin of apatite is as debatable ground as that of the rocks in which it occurs. Many are fond of ascribing to phosphate an organic source and seem to see a necessary connection between phosphorus in its compounds and animal life. Prof. G. M. Dawson suggests its formation from coprolitic layers, becoming crystalline by metamorphic action (before described). A discussion of this subject is of little practical benefit, but I would merely point out, in this connection, that *this* cannot be its primary origin. Coprolites, as we know, are the fossil excrement of animals. Now animals not being able to *create* any element, but only to assimilate and form new compounds, it is obvious that they obtained the phosphorus, which they possess as calcic phosphate, from the vegetable kingdom; the vegetable kingdom in like manner draws upon the mineral kingdom for its raw material. Hence in some form or other the phosphate existed before this Laurentian period, even granting that animal life was so abundant as to produce such a large deposit—a theory very untenable 'rom the general geology and palæontology of the period. It should be remembered that many other mineral phosphates occur in nature besides apatite. In a large number of cases the apatite is closely associated with pyroxene, and there is evidence to show that it has been derived, to a large extent, from this source. In small but appreciable quantities, phosphate of calcium has been shown to be a constituent of many metamorphic and igneous rocks.

Apatite occurs both crystalline and massive; the latter variety, however, may be said to be more or less crystalline in structure.

The crystals are usually found in a matrix of red limestone, and though presenting a very beautiful appearance are of little or no value, owing to the great difficulty in separating them from the limestone. Occasionally, however, large cavities of loose crystals are discovered, the matrix having become disintegrated and decomposed by atmospheric and other agencies.

The crystals consist of six-sided prisms with complete pyramidal terminations, though often possessing one pyramidal termination and one basal plane. In size, they vary greatly, viz., from those of less than half of an inch in length and corresponding thickness, weighing only a fraction of an ounce, to those of many hundredweights. A section of a good-sized crystal from this district is at the School of Science, Toronto.

The usual colour of crystals is green. Some, however, approach white, while others are of a pink, yellow, or violet tint, and others nearly black. Apatite in the massive condition shows the same variability, and in a more marked degree, with respect to colour. The colour appears to be purely accidental, and is due to various impurities mechanically mixed with the minerals. Thus the red and brown varieties contain minute crystals of hematite; the blue and green, scales of chlorite; and the yellow and violet owe their tints to organic substances. Some few years ago crystals were a rarity, as much as $5 being paid for one with good edges and terminations, though of small size; now they are so plentiful as to be practically valueless as specimens.

It would be well to mention here the so-called nodules, which appear to have been crystals, subsequently subjected to partial fusion, so that all exterior resemblance, except in size and rough outline, has been lost. It is possible that rounding of the edges is due to the solvent action of steam at high temperatures and pressure.

It is in the massive condition, as obtained from veins and "stocks" or "pockets," that it is extensively mined.

For some years it was supposed that apatite did not occur in true veins, but a study of the Templeton district has proved that such is the case. At Mud Bay, Lake McGregor, this is clearly shown by the phosphate deposit cutting the *strike* of the containing rocks; and again, in the same neighbourhood, there is a vein that has a true banded structure, the gangue consisting of alternating layers of calcite and mica and pyroxene. Examples are not wanting of veins consisting of alternate layers of pyroxene and apatite.

The veins are of various dimensions. Traversing the dead rock—limestone, pyroxene, &c.—they narrow and widen with great suddenness, and are characterized by an uncertainty of yield,—it being impossible to predict, by any formula, the "out-put" obtainable from any vein. The surface appearance may promise an abundant harvest, but at a few feet below the vein may become entirely "pinched" out. It is only right to add that the reverse of this has proved true—the vein increasing in width at the depth of a few feet. It is not uncommon to notice the phosphate in a vein, with an average width of say three feet for a depth of six or eight feet or more, suddenly narrowing to a thin streak only an inch or two in breadth. This may continue without much alteration for a further depth, and suddenly enlarging to a size equal to that of the upper deposit.

In some instances, large amounts have been obtained from veins—one in this district yielded eight hundred tons. It was situated on the side of a hill—an eminence apparently being favourable for the outcrop of both veins and pockets. As an off-set against the uncertainty in quantity, the quality is usually better than that of the "stocks." the phosphate being less intermixed with gangue. Cavities in veins often contain large crystals of apatite.

The greater quantity is obtained, however, from lenticular masses or "pockets," which would appear to be segregations from the enclosing rock matter, and more closely related to veins than to beds, which latter they are supposed to be by some geologists. They are from two to forty feet deep, and usually expand to a depth of a few feet. Sometimes the phosphate is entirely surrounded by dead rock, and a sharp line of demarcation may be drawn between them. When such a pocket or stock is exhausted, the hole has often a basin shape, in the bottom of which may sometimes be seen a thin streak of phosphate, perhaps only a few inches in width. In others, it would be hard to say where the phosphate ended and the dead rock began, so intermingled is the gangue. In a few instances borings, in deserted pits, have revealed the presence of phosphate at depths of from ten to sixty feet. It is probable, therefore, that in many cases further large deposits exist at lower levels. Almost all the apatite hitherto mined has been obtained from surface deposits, and until these are exhausted, little will be done toward developing these subterranean beds, owing to the great expense in removing the superincumbent rock matter.

"Stocks" very often occur close together, say ten to twenty in an area of five acres, with large intervening, perfectly barren tracts.

The mineral, both of the veins and pockets, presents itself in many varieties, both as regards colour and texture. The more common are the following: (1) Very fine granular, white, known as "sugar." (2) Granular white, spotted with red, known as leopardite. (3) Coarse and fine crystalline varieties of green, often tabular in cleavage. (4) Crystalline red varieties. (5) Violet, lustrous, semi-translucent. (6) Pink, much harder variety, of feldspathic aspect.

The operation of mining is extremely simple; it should rather be called a species of quarrying, except in a few cases where, quite recently, shafts have been sunk and underground workings employed for the extraction of apatite. Surface deposits being worked for the most part, complicated apparatus is not required. A derrick for lifting the mineral and *débris*, and a pump to carry off the accumulated water, seem to constitute, in most places, the entire plant.

The process consists in drilling holes of various lengths—one man holding the drill, which may be of inch and a-quarter steel, and another, or two, hammering. In places where there is not sufficient room for the striker, a long drill is often attached to a spring-pole. The method of working in this case is obvious. The holes are charged with gunpowder or dynamite, and well tamped with sand and broken rock matter, and the adjacent area is loaded with heavy logs to prevent too much scattering of the phosphate. The fuse being left of sufficient length to allow the men to retire in safety, the charge is fired. After the explosion the lumps of pure phosphate are placed by themselves, and those containing intermixed rock matter are removed to the dressers' tables, where, with small hammers specially made for the purpose, the gangue is separated as far as possible; but the phosphate being much softer than the intermixed matter, this can only be approximately done. Hitherto a phosphate containing 70% $Ca_3(PO_4)_2$ or over has been required, but probably in the future much of the stuff now in the "dump" will be used.

The gangue consists chiefly of quartz, feldspar, phlogopite (magnesian mica), pyroxene and calcite, and these, therefore, constitute the principal impurities in the commercial article. The predominance of calcite not only lowers the percentage of calcic phosphate, but decomposes much of the acid when the mineral is being converted into "superphosphate." The other impurities are insoluble in sulphuric acid, and consequently only lower the percentage of apatite present.

In this district (Templeton), if the mines are near navigable waters, the mineral is brought down in scows as far as possible, from whence it is teamed to the Ottawa River, where it is re-loaded on barges, or on the cars of the Canadian Pacific Railway for Montreal. It is shipped here as ballast principally, and exported to England, where it is treated with sulphuric acid, converting it into an acid phosphate of calcium, or "superphosphate," containing more or less sulphate of calcium, and sold either *per se*, or mixed with blood and other refuse for agricultural purposes. The action of sulphuric acid at a moderate temperature upon apatite may be thus depicted:

$$Ca_3(PO_4)_2 + 2H_2SO_4 = CaH_4(PO_4)_2 + 2CaSO_4.$$

Strange to say, although much United States capital is involved in our mines, little or none of the raw material is shipped there direct, but after treatment in England, a considerable quantity is sent there. The reason for this appears difficult to find, as materials for sulphuric acid manufacture are cheap, both here and in the United States.

It is of the greatest importance to the prosperity of the country that our farmers should early become aware of the great value of superphosphate as a fertilizer. Now, not only is phosphorus exported in this condition, but large quantities of wheat containing much phosphoric acid are sent out of the country; and thus the land is impoverished without the concomitant addition of this valuable element in the form of a soluble phosphate. A proper balance between the phosphoric acid removed by vegetation and that returned in the form of a fertilizer must be maintained, if we are to expect such bountiful harvests in the future as we have enjoyed in the past. With the realization of the worth of superphosphate by agriculturists, the manufacturing industry of sulphuric acid will receive a healthy impetus, and then we shall be more fully able to estimate the great value of our Canadian apatite deposits.

This paper is the result of information gained and observations made while staying with the late John G. Miller, on his extensive phosphate mines in Templeton Township, a few years ago; and in reading this paper before the Canadian Institute, a society one of whose duties and privileges it is to place on record the work of Canada's benefactors, I think it not inappropriate to conclude with a word of tribute to the memory of a gentleman who contributed not a little to Canadian Geology and Mineralogy, and who occupied a position in the foremost rank of the pioneers of phosphate mining. Mr. Miller was an enthusiastic and skilful worker, and, possessing an untiring energy, he placed Canada under a lasting debt of gratitude by the assistance he rendered the authorities of the Geological Survey, by the able articles which he contributed through the Ottawa press, by the enterprise which he displayed in opening up and developing Canada's mineral resources, and lastly by the large and valuable collection of minerals which he made, and which is now known in the Museum of McGill College as "The Miller Collection."

Dr. Ellis in referring to the opinion that many entertained as to the animal origin of Apatite, said one reason of it was the curious fact that fluorine was also associated with phosphate of lime in the bones of animals. He showed by a formula on the blackboard how fluorine played a necessary part in the composition of the mineral.

Mr. T. Nelson Dale inquired what was the chemical difference between the Norwegian Apatite and the Canadian.

Mr. Shutt stated that in one of the publications of the Canadian Geological Survey the difference between the Canadian and European Apatite was given.

Mr Dale alluded to the Apatite locality of Kragerö, on the southern coast of Norway, which he had visited many years before. The Apatite was pinkish in colour and opaque, resembling some of the Feldspars. The associated minerals were Ilmenite, Hornblende, Praseolite, Rutile, Epidote, &c. This Apatite had also been exported to England for fertilizing purposes. Another well known locality in Norway was that of Snarum, further inland. The crystals at these places generally had the basal plane with the pyramid. At Arendal, near Kragerö, the bluish-green translucent variety of Apatite occurred in small crystals, and here the crystals, especially those of Colophonite, had the peculiar rounding of the edges alluded to by Mr. Shutt as characterising some of the minerals of the Canadian Apàtite region, and due probably likewise to metamorphism, subsequent to crystallization.

Mr. Shutt remarked that as many as 30 species of minerals occurred associated with the Apatite of Canada. The opaque pink variety, closely resembling feldspar, mentioned by Mr. Dale as occurring in Norway, was also found in Canada.

The following paper by Mr. A. McGill, B.A., B.Sc., was then read by Dr. Ellis :

NOTES ON REICHERT'S DISTILLATION PROCESS FOR THE IDENTIFICATION OF BUTTER-FAT.

An abstract of Reichert's original paper appears in the Chemical Society's Journal, Vol. 36, 1879, p. 406. The facts (1) that butter-fat is distinguished from other animal and vegetable fats likely to be used in the sophistication of butter, by containing about 6 to 7 per cent. of butyric acid (as butyrin), and (2) that this acid is sufficiently volatile to make it possible to distil it over in a current of air, are made the basis of this process, which was originally carried out by Reichert as follows :—

2.5 grammes of the dry, filtered fat were weighed in the liquid state into a 150 c.c. flask, and saponified by the addition of 1 gram solid potassic hydrate dissolved in 20 c.c. of 80 per cent. alcohol; 50 c.c. water were then added, and then 20 c.c. dilute sulphuric acid (1 to 10 by volume). The mixture was then distilled, a slow stream of air being aspirated through. After 15 c.c's distillate was collected, this was returned to the distillation-flask, and the distillation continued till 50 c.c. was collected. This was titrated with deci-normal soda, litmus being the indicator. Reichert found that an average of 14 c.c. deci-normal soda was required to neutralize the acid in this distillate, with a variation of ± 0.45 c.c.

Medicus and Scherer (*Zeitschrift für Analyt. Chemie*, 1880, p. 159,) have examined this method, and highly recommend it. Various changes in it have been suggested, as by Meissl, who uses 5 grammes butter-fat, and a weaker alcohol for dissolving the alkali requisite for saponification in order to avoid the loss of volatile acid by etherization during saponification. Meissl collects 110 c.c. distillate, and finds a minimum of 26 c.c. deci-normal soda requisite for neutralization.

C. E. Schmitt uses phosphoric acid instead of sulphuric for decomposing the soap.

A. H. Allen (*Analyst*, Vol. X., p. 103,) has examined the process, and reports favourably upon it. He saponifies 2.5 grams fat with 25 c.c. semi-normal potash in a closed flask, and after evaporating off the alcohol on a steam bath, dissolves the soap in water, adds excess of dilute sulphuric acid, and makes up to 75 c.c., distilling over 50 c.c. He finds a minimum of 12.5 c.c's deci-normal alkali required to neutralize this distillate.

A paper read by R. W. Moore, A.B., M.S., before the American Chemical Society in September of last year, and published in the "Analyst" for December, shews the very great superiority of Reichert's process for the identification of cocoa-nut oil used as an adulterant of butter-fat, and was the immediate cause of my undertaking the work described in the following pages. My friend, the late lamented H. Sugden Evans, F.C.S., Chief Analyst for the Dominion, requested me to examine the process with a view to ascertaining the limits of accuracy obtainable by it under fixed conditions.

I prepared from a genuine butter, pure, dry fat, by allowing the salt and water to separate by subsidence in a tall beaker on the water bath at about 80° to 90° C., pouring off the supernatant fat, and freeing from suspended caseine, etc., by filtration (using a steam jacket). The fat so obtained had a specific gravity of 0.914 at 100° Fah. (water at 100° Fah. = 1).

The liquid fat was weighed by difference from a light glass tube, having a lip, directly into the flasks used in saponification.

The difficulty of weighing exactly 2.5 grams of fat suggested the use of an approximation to that quantity, and the subsequent calculation into *volatile acidity* per gramme of fat used.

I employed an approximately normal solution of alcoholic potash for saponification, the alcohol having a specific gravity of 0.823 (equivalent to 90 per cent. anhydrous alcohol). The saponification was effected in stoppered flasks of strong glass (the stoppers being tied down), on the water bath at 100° C.; and 10 c.c. alcoholic potash was used for each gram of fat taken. One hour was allowed for the completion of this process.

The melted soap was decanted into a flask of about 250 c.c. capacity, about 2-3 c.c. of dilute alcohol used to rinse, and 20 c.c. of approximately normal sulphuric acid (accurately 0.98 N.) added for each gram of fat used. During the subsequent distillation the flask was placed on a sand bath, and a pretty strong heat supplied by a Berzelius's alcohol lamp.

A tube leading to the bottom of the flask permitted a current of air to be aspirated through the whole apparatus. A 24-inch Liebig was used and kept well cooled. The distillate was collected in a graduate which was connected with a Richard's filter pump, by means of which a current of air was drawn through at the rate of about 4 to 6 bubbles per second.

The distillate, before titration, was thoroughly cooled (to about 55° Fah.) and filtered through wet paper. Phenol-phthalein was used as the indicator.

SERIES I.

These experiments were intended to illustrate the effect of using air *not* freed from carbon dioxide. The tube of the condenser did not dip into liquid in the receiver.

Number of Experiment.	Fat used.	Potash used.	Sulphuric Acid.	Distillate collected.	Total Acidity in c.c. on Soda.	Acidity per gram fat.
1	5.167	51.7 c.c.	103.3 c.c.	103.3 c.c.	21.0 c.c.	4.06 c.c.
2	2.975	29.7 "	59.5 "	59.5 "	10.2 "	3.43 "
3	3.809	38.1 "	76.0 "	76.0 "	17.1 "	4.50 "

The acidity found bears no constant relation to the quantity of fat used; nor is any average increase shewn for increasing quantities of fat used.

The arbitrary volume of distillate collected (equal to the quantity of sulphuric acid used, or to *two-thirds* of the total quantity of the liquid in the distillation-flask) is more than that collected in Series II., and less than that collected in Series III.

SERIES II.

In this series of experiments the air drawn through the apparatus was freed from carbon-dioxide by being washed through strong solution of caustic potash.

Number of Experiment.	Fat used.	Potash used.	Sulphuric Acid.	Distillate collected.	Total Acidity.	Acidity per gram fat.
4	3.669	36.7 c.c.	73.4	55 c.c.	9.6 c.c.	2.6 c.c.
5	3.089	30.1 "	60.2	46.3 "	8.7 "	2.8 "
6	3.376	33.8 "	67.4	50.5 "	9.3 "	2.75 "
7	1.638	16.4 "	32.8	24.8 "	4.7 "	2.86 "

From this series it appears that, while there is a fair approach to constancy in the quantity of volatile acid distilled over, there is a relative increase for lessening amounts of fat used. To find whether this was still observable with a larger (proportional) distillate, the next series of experiments was undertaken. In these the distillate collected was three-fourths as great as the total quantity of liquid in the distillation-flask.

SERIES III.

Number of Experiment.	Fat used.	Potash.	Acid.	Distillate.	Total Acidity.	Acidity per gram fat.
8	3.777	37.8 c.c.	75.6 c.c.	85.0 c.c.	15.6 c.c.	4.1 c.c.
9	2.967	29.7 "	59.4 "	67.0 "	12.2 "	4,1 "
? 10	2.487	24.9 "	49.8 "	56.0 "	11.9 "	4.8 "
11	2.054	20 5 "	41.0 "	46.1 "	8.45 "	4.1 "

A remarkable constancy in the acidity of the distillate, calculated on the fat used, is observable in this series, and seems to indicate that under the given conditions, the percentage of acid distilled over is constant. Experiment 10 is not to be counted, except as an illustration of the amount of error that may occur through not properly cooling the distillate before filtering. This filtrate became distinctly turbid on cooling (a circumstance noted at the time), although the results were allowed to stand.

In all the preceding experiments the delivery tube of the condenser merely entered the receiving graduate, not reaching to the bottom of it. In the following experiments the tube reached to the bottom of the graduate, and dipped into 20 c.c. of distilled water at the beginning of the experiments, and the aspirated air bubbled through the distillate during the whole of the operation.

SERIES IV.

Number of Experiment.	Fat used.	Potash.	Acid.	Distillate.	Total Acidity.	Acidity per gram fat.
12	3.188	31.9 c.c.	63.8 c.c.	71.8 + 20	13.9 c.c.	4.36 c.c.
13	3.475	34.7 "	69.4 "	78.1 + 20	15.85 "	4.56 "
14	1.563	15.6 "	31.2 "	35.1 + 20	7.4 "	4.74 "
15	3.847	38.5 "	77.0 "	86.6 + 20	16.6 "	4.31 "
16	2.693	26.9 "	53.8 "	60.5 + 20	11.6 "	4.31 "
17	2.257	22.6 "	45.2 "	50.8 + 20	9.6 "	4.24 "

Experiment No. 14 taken in connection with No. 7 would seem to indicate that with very small amounts of fat—say less than 2 grams—the volatile acidity found is higher than the average. The whole series shews that, as might be expected, a slightly higher volatile acidity is obtained when the first portions of the distillate are received into water already placed in the receiver than with the arrangement used in Series I., II. and III.

In the following table my average results, expressed in cubic centimetres of deci-normal alkali required to neutralize the acidity of the distillate found, for each gramme of fat taken, are compared with the results—similarly expressed—obtained by various chemists who have examined the process. The numbers have been calculated by me from a table of results given by Allen in the *Analyst* for June, 1885 (Vol. X., p. 105).

CHEMIST.	ACIDITY PER GRAM FAT.	
Reichert	5.6 c.c. d.n.	
Ambuhl	5.9 c.c. "	
Caldwell	5.9 c.c. "	
Schmitt	5.4 c.c. "	
Moore	5.3 c.c. "	
Allen	5.4 c.c "	
McGill	4.4+c.c. "	From Series IV.
McGill	4.1 c.c. "	From Series III.

It will be seen that the average acidity obtained by me is much lower than by the other chemists named. This may be due either to the different conditions under which the work was done, or to the different character of the butter fat submitted to examination. I can vouch for the absolutely accurate strength of the standard alkali employed in titration of the distillate; and I also took care to ascertain that no traces of sulphuric acid were present in the distillate. The process is, of course, not intended to estimate the *total volatile* acid in a butter fat, but only that which is volatile under *exactly* defined conditions; and the examination which I have made justifies me in saying that with the same fat, under constant conditions, the quantity of volatile acid distilling over is constant within 3 to 4 tenths of 1 c.c. deci-normal for each gram of fat used, provided that not less than 2 or more than 4 grams be taken.

I may add that the work described was done in January of this year (1886); since which time I have had an opportunity of examining several commercial butters by the process, carried out as in Series IV.; and I have found no sample examined to give more than 4.5 c.c. deci-normal per gram.

Dr. Ellis read a paper on "Determination of Tannin in Spices, particularly Cloves and Allspice." For this paper see page 214, vol. IV., *ante.*

FIFTH MEETING.

Fifth Meeting, 4th December, 1886, the President in the Chair.

Exchanges since last meeting, 33.

D. A O'Sullivan, D.C.L., read the following paper on "The Jurisprudence of Insanity."

To the law of the land is entrusted the protection of the lives and property of all entitled to seek that protection. It professes to be no respecter of persons, but it is obliged, nevertheless, to take notice of certain states and conditions which may be regarded as exceptions to the general rule. The first and second childishness, the reason impaired by abuse or defective from natural causes, and the various forms of mental unsoundness, exact a share of the law's protection under the exceptional class of cases referred to. When we consider that one person in every three or four hundred is unfit to take care of himself or his property, it becomes evident that the law frequently finds itself confronted by a very large class of cases requiring a display of the nicest discrimination, while each case unfortunately is almost always useless as a guide for the next instance that may present itself. When in every day life, as we are assured, very many doctors, lawyers, clergymen, merchants, as well as ordinary day labourers, go on each with his proper work while yet a victim of delusional insanity, it is evident that at any moment, and from any quarter, a specimen case may present itself for the consideration of the Courts.

The class of cases which I propose to discuss in this paper is comprised very generally under the head of the ordinary term "insanity," though the legal term is "unsoundness of mind," and the questions which Jurisprudence has in view are:—

1. When is any given person to be considered as insane.

2. What degree of responsibility or capacity is he fixed or gifted with.

The law sets out with the assumption that all men are sane, but nevertheless it recognizes the fact that some are insane; just as the law recognizes the existence of crime, although acting ordinarily on the presumption that every person accused is innocent. The law assumes the more noble, more perfect state of humanity.

The gradation from sanity to insanity, as from health to disease, or light to darkness, may be slow or instantaneous, as those versed in such matters may speculate. The law when called upon has to say which of the two states exists. The twilight stage — part sane and part insane, weak-minded, balancing between capacity and incapacity—is a condition that calls for the greatest vigilance at its hands, especially as regards property and contracts generally.

"Sanity," says a great English lawyer, "exists when the brain and the nervous system are in such condition that the mental functions of feeling and knowing, emotion and willing, can be performed in their regular and usual manner."

"Insanity," says the same authority, "means that state in which one or more of the above-mentioned mental functions is performed in an abnormal manner, or not performed at all, by reason of some disease of the brain or nervous system."

The result of this is stated by the same author to be knowledge that an act is wrong and the power to abstain from doing it. This is the test in criminal matters. A similar rule applies in civil cases.

How is it to be determined that any given person has knowledge of right and wrong, and a will to do the one and shun the other?

It is difficult for medical men to listen to lawyers discoursing on diseases of the brain and of the nervous system; and on the other hand the lawyers and judges thought and think that they know as much of the functions of feeling and knowing of emotion and willing as is permitted to the medical gentlemen.

The jurisprudence of insanity is in consequence a subject claimed by doctors and by lawyers. It is one of those debatable territories on the border lands of two sciences that needs the assistance of the best minds in both; but it so happens that these are not always in harmony, indeed sometimes in apparent or real contradiction. Each one claims to be the real judge or the sole judge, and each disputes the right of the other to decide what may be common issues.

The medical men assert that common sense and science are with them, and it may be so; but the fact is that the legal luminaries have not only the law, but what is more important the verdict on their side. The conflict continues apace. The Courts and the lawyers have retained for a long time their view of the matter, and are unmoved by any advancements in the medical world. The medical writers adhere to their own views, and are not sparing in their ridicule of unskilled persons meddling with things of which they know nothing.

"The ground which medical men should firmly and consistently take in regard to insanity," says Henry Maudsley, "is that it is a physical disease; that they alone are competent to decide upon its presence or absence; and that it is quite as absurd for lawyers or the general public to give their opinion in a doubtful case, as it would be for them to do so in a case of fever."

Mr. Balfour Brown replies to this as follows:—"No lawyer wants, so far as we know, to give his opinion either as to insanity or as to fever. He does not profess to be able to do so, but he does assert that he and the public are in a position to judge of conduct, that the proof of the existence of such insanity as incapacitates for civil acts or renders an individual irresponsible in case of the commission of a criminal outrage lies in conduct, and that the fact that in the case of the insane the act is the result of certain changes which medical men have chosen to call disease, and that in the other it is due to certain changes which medical men have with as much arbitrariness chosen to call health, has nothing whatever to do with the subject."

To obtain the result of a perfectly legal and otherwise irreproachable lunatic or person of unsound mind, the assistance of two sciences is requisite; so law and medicine combine for that purpose, then after each particular sentence is pronounced relapse into their accustomed and time honoured antagonism. The offspring is begotten of this wrangling parentage, though the peace of the family be endangered thereat and thereafter.

It is natural and proper that each scientific person considering any subject in his particular line, as it is said, should view it with reference to his own special training and profession. The metaphysician and the physiologist meet on the one ground and each claims it as his own, one surveying it from a mental the other from a material point of view. In the same way a medical man and a lawyer brought face to face with a madman in the dock or in the witness-box come to regard his capacity or responsibility as subjects for detection in their own particular way. Theoretically medical skill must pronounce as upon any disease looking out for symptoms and making a diagnosis. Practically it keeps its eyes and ears open and observes what are less ordinarily the *indicia* of disease—of the absence of health. Legal skill, on the other hand, is thrown entirely, or almost entirely, on observations upon the conduct of the person in question, on astuteness under examination, propriety of an action under certain conditions, and on the thousand and one circumstances that separate common from extraordinary conduct. The judges and the Courts say—the law in fact lays it down—that what justice or equity demands is, not whether the particular individual is diseased mentally, but whether his conduct is the result of a sound mental guidance. If it is, then he is to be treated as other persons, and the law cares no more for the disease than the jury cares for the name of it. This disregard of medical science and of complicated classification is not relished by doctors, but they console themselves by the reflection that they instructed the Court, and possibly confounded all others by the intensely scientific character of their answers.

The law then is primarily concerned with the condition of the mind, the disease is of secondary importance. Medical skill aims to detect the disease, and if possible to remedy it; for this the law cares nothing ordinarily, its object is to discover capacity and responsibility. On this subject, as on all others within the province of evidence, the purpose of the law is to obtain information just as it would endeavour to discover foreign law, or ecclesiastical law, or facts concerning engineering, mechanics, or any of the arts and sciences. What medical experts and writers complain of is that judges and lawyers can and do know nothing of disease of insanity, while the legal gentlemen say it is too much and intolerable that the witness should usurp the functions of judge and jury, and claim the right of deciding the whole question.

The common ground upon which these conflicting scientists fight this battle is evidently the mind—an unsound mind law says, a diseased mind medicine says. The chief difficulty is, therefore, not which science should claim the exclusive right of appropriating the mind, but what the mind in itself is. When the mind is diseased, one party says every act is that of a diseased mind, and is, therefore, to be regarded as an insane act. The mind is a totality says Lord Brougham; and this has been quoted approvingly by Dr. Willard Parker, by Dr. Gilman, and others of eminence.

The Courts of law, however, have not acted upon this doctrine, and they repeatedly and every day act upon the assumption that a man may be sane upon one subject and insane upon all others, or that being insane upon one, or a monomaniac, he may be sane upon all others. He may be subject to delusions, but otherwise sensible. And so a man who is unquestionably insane upon one or on a variety of subjects, may yet have his will upheld, or his contract enforced against him. If he understands fully what is necessary to dispose of property by will or by agreement, he may be so far as the law cares hopelessly and incurably insane upon all others. Does he understand the nature and value of his property, his relations and their claims upon him? Then his will stands, though it were drawn (as wills have been drawn) in the rooms of an asylum. If he understands the value of property and conducts himself so that the other party had no suspicion of his insanity, then his contract can be enforced against him, though his object were to use that property to erect another tower of Babel.

These conclusions of the Court leave no doubt as to its view on the totality of the mind and on the effect of a diseased mind, though it is not disputed that many able lawyers side with the medical view. It is evident if unsoundness as here been stated is due to diseased organisms, the doctors ought to be the proper, and indeed the sole judges; but if there be such a thing as mental unsoundness with physical integrity, then the lawyers have good foundation for their reasoning.

There is a form, perhaps many forms of physical disease, which result inevitably in mental weakness, and so given certain symptoms the result is predicated to a certainty almost mathematical.

There is a disease which I take as an example, because it is probably as good for a popular example of medico legal strife as any other: a disease called *Locomotor Ataxia.* The name primarily suggests a want of order in physical movements; as for example when the patient in attempting to drink would bring the glass to his ear, or would walk to the window in the endeavour to go out the door.

To be exact I append the examination of Dr. Seguin, Specialist Professor of Diseases of the Mind and Nervous System in the University of the City of New York, in reply to questions I put to him in a contested Will case a few years ago. The doctor, after referring to the different stages of the disease, replied as follows:—

Q. Please define briefly the first and second stages of this disease, [Locomotor Ataxia.]—A. The first stage is characterized by the recurrence of peculiar neuralgic pains in the legs, by absence of relex movements at the knee, and by double vision in some cases. The second stage consists in the above symptoms, with the addition of a staggering, jerky, or ataxic walk, and in some cases ataxic movements.

Q Are the symptoms of this disease solely physical, or are they both physical and psychical?—A. Purely physical.

Q. Has Locomotor Ataxia any effect upon the mind?—A. Not except through the occurence of a rare complication.

Q. Will you state shortly what complications in this disease give rise to mental impairements?—A. In a few cases, from one to two in a hundred, in my experience, the symptoms of the disease known as General Paresis, or Dementia Paralytica, make their appearance after the development of the Ataxia.

Q. Will you state briefly the physical symptoms of a person affected with Dementia Paralytica?—A. These are: first, a condition of tremor of the muscles of the face, tongue, and hands, clearly visible to the eye, and sensible to the touch; second, a vibratory tremulous articulation—words are often clipped or shortened; third, a tremulous, jerky handwriting; fourth, unnatural smallness of and inequality of the pupils.

Q. Will you state briefly the psychical symptoms of a person affected with Dementia Paralytica?—A. They are: first, progressive impairment of memory and judgment; in other words, dementia. Second, variable mental state; which may be hypochondriacal, or melancholic, or maniacal. Usually, the patient is active and exacted; entertains delusions of great strength, of vast wealth. He has extravagant plans and boasts. These exalted notions are very numerous, and constantly changing in a given case. They are not fixed ideas.

Q. What is the chance of recovery in the case of a person afflicted with Dementia Paralytica?—A. There is no chance of recovery.

Q. To which of the two classes of symptoms, physical or psychical, do you attach the most importance in Paresis?—A. The physical symptons are more constant, and appear earlier, in my opinion. In some cases of Dementia Paralytica, the physical symptoms, together with failure of memory, are the only symptoms to the end of life.

Q. What is the mode of attack in Dementia Paralytica?—A. Usually by the gradual development of the physical symptoms I have named and diminution of memory, and by faults in judgment.

Q. In your experience, have you known a case of sudden attack in Demen-Paralytica?—A. I have not.

Q. Are the exalted notions to which you have referred confined to Dementia Paralytica, or are they found in other forms of insanity?—A. When varied and numerous, exalted delusions are highly characteristic of Dementia Paralytica, but not pathognomonic. When the exalted notions are few and fixed, they are indications of a condition of mania subacute or chronic.

Q. Can there be said to be anything hereditary in the disease, Dementia Paralytica?—A. The hereditary tendency in this disease is not strong, and is usually indirect.

Q. Generally speaking, have persons afflicted with Dementia Paralytica testamentary capacity; and, if so, what?—A. In some cases with uninterrupted progressive development of the disease, there is usually no such capacity; in other cases characterized by alternations of excitement or mania and remarkable remissions, the patient may, in my opinion, be capable during such remissions of correctly expressing his testamentary wishes.

Q. Generally speaking, is testamentary capacity affected in Locomotor Ataxia?—A. Not at all, in my opinion.

Q. Is there any defined limit to the advancement of the disease, Locomotor Ataxia?—A. There is none. It may terminate fatally in a few months, or there may be no advance in the symptoms for many years.

Q. Is there any defined limit to General Paresis of the insane?—A. There is no defined limit, but I have stated it as my opinion that no case has extended over six years which has not terminated by death. I have known no case which has recovered, and it is my opinion that it is always fatal.

On this point also I had the opportunity of examining Dr. Wm. A. Hammond, one of the best known scientific experts in America, or perhaps now living. In this examination, of course, I pursued only the facts of the particular case. I incline to the view (though

I don't know) that such cases are comparatively rare; when they do occur, it is manifest that if that be the weight of medical evidence no judge would feel disposed to set it aside in favour of a finding of mental unsoundness by reason of rational conduct in the person so affected. Conduct is deceptive and can be simulated when the *indicia* of disease cannot be concealed. The important part of Dr. Hammond's evidence is the following:—

Q. What has been your experience in cases of this character ending in mental disorder?—A. I have known several cases where that has occurred, one especially, that of a distinguished actor, under my charge for several years with Locomotor Ataxia, and not shewing any mental aberration until towards the last of his life, when there was decided mental disorder.

Q. Does the mental aberration you refer to point toward any particular form of mental disorder?—A. I should say distinctly, no, it does not, but there is a disease of the brain that occasionally resembles in its ataxic symptoms Locomotor Ataxia. There is a cerebral form of Locomotor Ataxia, which is not common, and a spinal form of general paralysis of the insane. In the one case, the mental symptoms are superadded to the spinal; in the other, the spinal are superadded to the mental.

Q. Is it the exception or the rule that in disease of Locomotor Ataxia the brain becomes affected through the medulla oblongata?—A. The brain may be affected in two days in Locomotor Ataxia, either by extension through the medulla oblongata or indirectly through the sympathetic nerve.

Q. In case the brain is affected by the former, what symptoms are present? —A. Irregular action of the heart; nausea and vomiting; difficulty of swallowing, and irregular respiration. Locomotor Ataxia sometimes ends life suddenly, before the morbid symptoms reaches the brain.

Q. Does any implication of the medulla oblongata necessarily suppose mental disease?—A. It does not.

Q. What percentage of cases of Locomotor Ataxia coming under your observation resulted in mental disease?—A. I should say not one per cent. In the sixth edition of my book on nervous diseases, I did not call attention to insanity as a symptom of the disease, Locomotor Ataxia. This may be because my attention was not specially directed to it, and since such sixth edition, I have seen seven or eight cases. My sixth edition was written four years ago, and my new book, soon to appear, will express my views upon this point. The recognition that there are sometimes symptoms of insanity accompanying Locomotor Ataxia, is a fact comparatively recent.

Q. What would you regard as the best indication that a patient affected with Locomotor Ataxia was progressing towards insanity?—A. The recurrence of delusions.

Q. Are there any other psychical symptoms?—A. A change in the emotional characteristics of the patient. He laughs and cries without sufficient cause, and becomes suspicious of those about him. These are the most prominent.

Q. Will you state the physical symptoms?—A. Probably the first would be some disturbance of the vision, and motion of the eyeball. Speech may be affected, and convulsions may occur. The hearing may be impaired. The patient may die in convulsions; but all these symptoms of brain lesion may exist without insanity, and such is generally the case. There is a distinction between the cerebral symptoms accompanying Locomotor Ataxia and the mental symptoms of insanity.

Q. How do these symptoms make their appearance—slowly or suddenly?—A. Either they may be developed slowly or suddenly, according to the means by which they are produced. The sudden appearance of the disease is by the sympathetic nerve, whereas the gradual development is through the medulla elongata.

Q. What value do you place upon the test of handwriting?—A. The handwriting would not be affected unless the disease had advanced high enough to affect the arms; and when it did so rise, the arms would not be co-ordinate, the same symptoms would appear in the arms as in the legs.

Q. What conclusion would you draw from the fact that the patient wrote a firm hand?—A. I should say that the disease had not reached the upper portions of the spinal cord.

Q. In Locomotor Ataxia, does the disease necessarily affect the mental power?—A. No.

Q. In General Paresis of the insane, would you say that the person had testamentary capacity?—A. There are stages. When the disease is well established, I should say the patient was entirely deficient in such capacity. There are remissions in the disease in which the patient is apparently lucid, but he is not to be depended upon even in these conditions.

Q. What is the duration of this disease, usually?—A. On the average, three to five years.

The law having with the combined assistance of the technical evidence of medical experts and the common sense of a jury, became apprised of the fact that the person under consideration is insane, the judge or Court is left to its self to decide what follows. If in a civil case under a contract or a will, the Court must say whether or not there was sufficient capacity to perform the act in question; if in a criminal matter to decide how far the accused is responsible and so punishable.

The law of England and of this country, so far as I can make out, is that the same rule in effect is applicable to both class of cases. As may have been expected few cases are to be found on what is for the most part a question of speculative law; but Chief Justice Tyndal and Sir James Hannen have both expressed themselves to the effect that the same formula holds good in both cases. The learned Chief Justice in dealing with a case of irresponsibility by reason of a "defect of reason from diseases of the mind as not to know the nature and quality of the act he was doing, or if he did not know it. that he did not know he was doing what was wrong," goes on to say that this illustrates a civil case of a will fully under the same principle. In a case of murder, for example, you have, say a knife in the hand of the accused. Does the latter know the consequences of putting the knife in the heart of the living man, and does he know it is wrong? In the other case of a disputed will, put his possessions, his money before the testator. Does he know the effect of signing with a pen in his hand a sheet of paper that will operate as his will? Does he know his property, his relatives, and their claims on him, and so on?

One American case has not followed these views of the English jurists, and of the general conclusion of American judges, but held that a less degree of imbecility is necessary to invalidate a will than would be found for acquittal from a criminal charge. As Mr. Balfour Brown has expressed it, "The question in connection with crime is: Does the accused know what he is about, and can he refrain; has he capacity to choose one course rather than another? That in connection with testamentary dispositions is: Did the testator know what he was about, and had he power to will this disposition?" And so if he knows that death ensues to a living man by means of wound with a knife, and that he knows he is raising his arm and has the strength necessary, there is knowledge sufficient to criminate; otherwise the knife was, as Mr. Brown puts it, a mere instrument in the hands of disease. The knowledge in the civil case is of a like character; a man must know whether he had $100 or $10,000 worth of property; he must know that a will is an instrument by which his wishes are given effect to after his death; he must know whether or not he has relatives, who are his relatives, and what claims they have on him and his bounty. If he knows nothing of these things, he knows not what he is doing. In the same way the law holds that if he knows these and is insane upon every other point, his will is valid as if he were sane in every particular. This may be taken as an exact enough summing on this prolific source of litigation; and the civil side may be disposed of with the remark that as to contracts generally it requires much more capacity than to make a will, though even this is now questioned.

On the criminal side the law is not easily stated, nor is it so satisfactory. The foundation of irresponsibility is the inability to distinguish right from wrong; but if a man has this power of distinguishing, and is yet impelled by mental disease to raise his hand and slay some one, he may not be punished. An act is not a crime, unless the person committing it knows not only that it is wrong, but knows the nature and quality of act, and is free to do it or leave it alone. These elements combine a number of things about which people are not always agreed; people who are perfectly sane, and who can give a good account of their belief. What is highly reprehensible to one, may be less so to another, or to a third more so; and so in an ascending or descending scale from the average mind. Yet this part of the verdict is the least difficult, because the results are as evident as if the element of insanity did not exist. A man killed or injured by a lunatic is as palpable a result as if killed by a sane man. But to discern whether or not the accused was impelled irresistibly to kill him, or if the doing of it was believed by the accused to be a wrong forbidden by law, are things generally much more difficult to determine.

If a man has an insane delusion that by shooting his neighbour he will benefit the whole community, he may work himself up to the degree of committing the deed. He knows that death will ensue; he expects it, his delusion would not be satisfied without it; he knows too that it is forbidden by law, but he is impelled by his delusion to go on consistently in his insane project. For such an act, under the law as it stands, this man would hang, unless he was insane in other respects. But this rule of the judges, and a hard rule it is, really applies only to one class of the insane—to monomaniacs. To one man who wants to steal everything, and to another who desires to set fire to his neighbours houses, or to kill people, the plea of insanity is unavailing until the mind is shown to be gone in other respects.

The fourth answer given by the English judges to the House of Lords raises a cognate question to this. If a man labouring under an insane delusion believes that his neighbour is attempting to take his life, and if he kills him in self defence he is free, though his neighbour may have only the kindest feelings towards him. But if he killed him because he fancied his neighbour did him a wrong, he would hang for it, because revenge and not self defence would be at the foundation of his act.

The only other point in which the judges make answer was that already referred to. In their view of the law to establish a defence of insanity it must be clearly proved that at the time of committing the act the accused was labouring under such a defect of reason from disease of the mind as not to know the nature and quality of the act he was doing, or if he did know it, that he did not know he was doing what was wrong.

It would be impossible towards the end of this paper to refer to the criticism that has been bestowed by medical writers on these extra-judicial opinions of the judges of England. To hang or imprison as a felon an insane man seems a shocking proceeding. Not that insane people are to be let at large, or that sane people are not to be protected. A man nurses delusion until it masters him, is controls his acts, it forces him to do extraordinary things. The kings and queens in our asylums would consistently put to death the subjects unreasonable enough not to pay court to them, and outside the asylum they would possibly hang for such an act. If the mind has its separate compartments for an individual craze leaving the others as in sane people, there may be reason for the law, but it is hard to suppose a case where there is deeply seated delusion so clearly cut from all other notions as not to influence them in some degree. I think that Mr. Stephen, following the idea in Lord Brougham's totality of the mind, was well justified in recommending a verdict of guilty, but his power of control was weakened by insanity. To punish for the same offence an insane man in the same way as you punish a man in his full senses appears an unequal dispensing of justice, and so far as the ends of punishment are concerned must fail to a great degree in the case of the insane man.

Dr. Cassidy referred to the difference between the legal and medical views of insanity. The lawyer naturally directed his attention to the conduct of the individual, and endeavoured to form an estimate of it. The physician, who studied the nature of the disease, its origin, symptoms and character, would be better qualified than the ordinary observer to pronounce on the insanity of an individual. In many cases where there was a degree of unsoundness of mind, it was difficult to decide whether it amounted to insanity. In these doubtful cases the experience and scientific skill of the physician would render him better qualified to give an opinion than the lawyer.

Dr. Oldright, referring to the instances of abnormal conditions of uncertainty mentioned by Dr. Cassidy, said that such questions had occurred to himself, though he did not let them go to the stage of worrying himself as many had done. He knew cases where persons had injured themselves in morbid conditions of uncertainty. He agreed with the last speaker that a medical man was better qualified to judge of cases of insanity than a lawyer. He sees more cases, and sees them at an earlier stage. The lawyer seldom sees the early stages of the symptoms.

Dr. Ellis, in referring to *Locomotor Ataxia*, said that in many cases the mind was not diseased.

Dr. O'Sullivan said that in working up a case, he made enquiries in New York of eminent authorities whether *Locomotor Ataxia* necessarily resulted in insanity. The answers were not very decided either way. The opinion seemed to be that in the milder stages it did not.

Mr. H. R. Wood, B.A., read a paper, entitled "Contributions to Blowpipe Analysis."

SIXTH MEETING.

Sixth Meeting, 11th December, 1886, the President in the Chair.

Certain amendments to the Constitution and Regulations were adopted.

Exchanges since last meeting, 216.

F. N. Kennin, B.A., Ernest C. Mackenzie and John H. Horsey, were elected members.

Mr. A. F. Chamberlain, B.A, read the following paper on "The Relationship of the American Languages."

I shall devote this paper to an inquiry into the arguments which have been advanced in favour of the north-eastern Asiatic or Peninsular origin of the American Indians, and an endeavour to assign to them an origin in other directions. That the question of American Origins is still an open one is apparent. Thus, Prof. Flowers, an eminent ethnologist, says: "It is quite as likely that the people of Asia may have been derived from America, as the reverse," (Pop. Science Monthly, Jan., 1886); and, speaking for a sister-department of the science of man, Horatio Hale, the distinguished American philologist, declares that "Philologists are well aware that there is nothing in the language of the American Indians to favour the conjecture (for it is nothing else) which derives the race from Eastern Asia," (Indian Migrations as Evidenced by Language, 1883, p. 25).

The Eskimo, the most northern of our American aborigines, have in particular been claimed as being certainly northern Asiatic in their origin. They seem, however, to possess in the most marked degree, the characteristics of a very primitive people. With regard to their origin, their scanty mythology and their legendary lore furnish us with no clue; their religion is silent; and no evidence of recent Asiatic origin can be gleaned from an inquiry into their language. I insert here a short comparative vocabulary of those Eskimo dialects which it seems certain have sprung from a common stock. Though in many instances the affinities may not be striking, they are still sufficient to bear out the idea of a common origin.

COMPARATIVE ESKIMO VOCABULARY.

ENGLISH.	KOTZ. SOUND.	TCHUKTCHI.	KADIAC.	UNALASKA.	ALEUTAN.	GREENLAND.	HUDSON'S BAY.
bear	tsunak	kainga		tanhak	tanguak		nennook
black	kangnoak			kahchehzeek	kaktshikluli		kerniuk
blood	aook	auku	auk	amak	aameyek		aoonak
canoe	kaiyak	kajak	palayak				keiyak
daughter		pannica				panik	pannueeya
day		aghynak	aganok	anneliak	anghalik	ullit	
dog	kenma	kymyk		aykok	uikuk		keimeg
ear	tscheeutik	tschintak	tshijun	tootoosuk	totusak	suit	heeutinga
earth		nunna	nuna	chekeke	tshekak	nuna	noona
eye	eerruka	iik	inalak	thak	thack	irsik	eieega
father		atta	adaga	attak	attan	attalak	attata
feet	idiguy	iguk	igugu	keetok	kita	isiket	ittikeik
fingers	tamaridreh			athoonen	atchon	tirkerit	tikkiek
fire	ignuck	annak	knok	keyhnak	kignak	ingnek	ikkooma
fish	khalloo	ssaljuk					ekkalloo
great		kaaguk			taangoellik		angerooke
hair	nuchet	niyak	nujet	imleen	emley	nyak	nuyakka
hand	arge-gei		eshet		tsha	arkseit	addeeyutka
head	neakoa	naskok	naskok			niakuk	neakoke
house			oolak			iglo	igloo
I	wonga	wanga			keen	wanga	ooanga
man	tuak	juk	shuk	tayaho	toioch	innuk	innueet
moon	tadkuk	tankuk	toogehda	tooheedak	toogithak	anningat	anninga
mother			anaha	annak	anaan	annanak	amama
mouth	kainneeak		kanok	aheelrek	aghilga	kannek	kanneera
night		unjak	amak	aingik			oonooak
nose	kingar	chinga	kinaga	ankozin	anghosin	kingak	kingara
rain				chehtak	tshiotakat		
red		kakluk	kawychly	oolluthak	aluthak		aoopalook
river	koouk	kiuk	kuik	chehanok			koo
sky	keilyak	kuilak	keliok	innyak	inkak	killak	keiluk
snow		annu	anuju	kanneeh	kaneek		kanneuk-poke (it snows)
son		rinaka				ernek	eerninga
star	obloaret			stan	sthak		oobiooriak
stone	angmak	aigach	yamak	koovvanak		ujarak	ooyarra
sun	neiya	shekenak	agadak	ahhapak	akathak	ajut	neiya
tongue		kandak	agonok	ahnak	aghnak	okok	okhara
tooth	kootay	gutyk	chudyt	keahoozen	aghalun	kiutit	keuteetka
water	eemik	mok	mooe	tanak	taangak	imek	immek
white	kowlook	katulge	katogalee	oommeleek	komakuk		kowdlook
woman	oolea	aganach	aganak	onhahenak		arnak	arnqua'
one	adaitsuk	atamek	attauden	atoken	attakon	attamek	attowseak
two	eepak	malgok	aslcha	arlok	alluk	arlaek	ardlek
three	pingeyook	pinajut	pingaswak	kankoo	kankoon	pingajuak	pingahuke
four	tsetumet	istamat	stamik	seecheen	shitshin	sissamat	sittamat
five	taleema	tatlimat	talimik	chaan	tshang	tellimat	tedleema
six	aghwinnak	atashimagligin	aghoiljujun	atoon	attoon	arbouek	argwenrak
seven	aghwinnighipagha	nalguk	malchonghin	oolloon	olung	arlekh	argwenraktowa
eight	penniyooik	pingaju	entjujun	kancheen	kamtshing	arbouek pingasut	kittukleemoot
nine	seetuma	aghinlik	kulnghuen	seecheen	sitching	kolliniloet	mikkeelukkamoot
ten	tadleema	kullo	kulon	atek	hasuk	kollit	eerkitkoka

From this we see that the Greenland *attatak* (father) becomes in Kadiac *adagu*, in Tchuktchi *atta*, and in Aleutan *attan*, in Unalaska *attak*; *annanak* (mother) becomes in Unalaska *annak*, in Kadiac *anaha*, in Aleutan *anæan*; *arkseit* (hand) becomes in Kadiac *eshet*, in Aleutan *tsha*; *ingnek* (fire) becomes in Kadiac *knok*, in Tchuktchi *annak*; *immek* (water) becomes in Tchuktchi *mok*, in Kadiac *mooe*; *ujarak* (stone) becomes in Tchuktchi *aigach*; *oonooak* (night) becomes in Tchuktchi *unjak*; *keuteetka* (tooth) becomes in Tchuktchi *gutyk*, in Kadiac *chudyt*; *attowseak* (one) becomes in Kadiac *attauden*, in Unalaskan *atoken*, in Aleutan *attakon*; *ardlek* (two) becomes in Aleutan *alluk*, in Unalaskan *arlok*; *pingahuke* (three) becomes in Tchuktchi *pinajut*; *sittamat* (four) becomes in Tchuktchi *istamat*, in Kadiac *stamik*; *kollit* (ten) becomes in Kadiac *kulen*, in Tchuktchi *kulle*; *ekkaloo* (fish) becomes in Tchuktchi *ssaljuk*. From this examination of the Greenland and Hudson's Bay Eskimo, the Eskimo of Kotzebue's Sound, the Tchuktchi, Kadiac, Unalaskan and Aleutan, we see that they have all sprung from one common stock; that the language of Greenland and Hudson's Bay approaches the nearest to what must have been the common tongue of the primitive stem from which they have all separated. And moreover I believe that the separation of these tongues from the parent stock took place in America, not in Asia. A comparison with the Tungusian, the Koriak, and other languages of north-eastern Asia, reveals many affinities which tend to show that these also are derivative languages, but have suffered much more change than the other members of this primitive family. The Kamtschatka tongue bears upon its face the evidence of great corruption and loss of words, and replenishing from other and less cognate dialects, but there is still proof enough to connect it with the great northern American family.

I believe also that the Lapps, Samoiedes, and the whole so-called "Mongolian" peoples are related to the peoples of northern America; that their languages have had a common origin, and that the seat of the primitive stock was in America. The long period which must have elapsed since their separation must necessarily have worked great changes among the numerous languages of this family, but there yet exist many distinct evidences of their common linguistic origin.

In proposing the origin of the Mongolian Peninsular Asiatic and languages of Asia from America, I believe I am offering a fair explanation of the fact noted by Dr. Latham, "that the Peninsular languages agree in the general fact of being more closely akin to those of America than any other." Before passing on to consider another family of speech, I will cite the opinions of two eminent writers, Dr. Robt. Brown (Races of Mankind, Vol. I.) and Dr. Rink, who have held that the Eskimo are not recent immigrants from Asia, but are an "Hyperborean American race" forced by circumstances and the inroads of other peoples into the position they now occupy. Dr. Rink says, "The Eskimo people evidently representing the north-polar coast people of America, the first question which arises seems to be, whether their development can be conjectured with any probability to have taken place in that part of the world. Other geographical conditions appear greatly to favour such a proposition" (Eskimo Tales and Traditions, 1874, p. 70), and again: "There is very little probability that a people can have moved from interior Asia to settle on the polar sea-shore, at the same time turning Eskimo, and afterwards almost wholly migrating to America" (*Ib.*, p. 73). Dr. Rink also concludes that in the religion and mythology of the Eskimo there is nothing that can prove the recent Asiatic origin of that people. The great Athapascan stock of languages shows some traces of affinity with the Eskimo family; but the great diversity and corruption of the vocabulary show that a considerable period has elapsed since they separated from the parent stock. Members of this family are found as far south as New Mexico; and Prof. Buschmann (Ueber die Spuren der aztekischen Sprache im nördlichen Mexico und höheren ameriknischen Norden, Berlin, 1854, p. 648) has shown that the languages of the Comanche, Wihinast, Utah, &c., have numerous marked affinities with the Aztec.

We now come to the great Algonkin group, which in particular has been claimed as of recent Asiatic origin. Whatever linguistic affinities can be shown to exist between this or any other group and the Peninsular languages of northern Asia, do not, as I have shown, prove satisfactorily an Asiatic origin. A great deal of argument has been based upon the idea that the legends, traditions, and mythology of the Indians prove for them an origin from north-eastern Asia; and those of the Algonkin tribes have been most frequently cited to that effect.

Horatio Hale (Indian Migrations as evidenced by Language) discusses this question with regard to the Dakotan, Wyandot, Iroquois and Choctaw-Muskogee families, and comes to the conclusion that, instead of pointing towards Asia, the traditions of these peoples point to the north-east as the land of their forefathers and their earliest abode. He says: "The striking fact has become evident that the course of migration of the Huron-Cherokee family has been from the *north-east* to the *south-west, i.e.* from eastern Canada on the lower St. Lawrence to the mountains of northern Alabama" (p. 11). Mr. Hale and others have shown the connection which exists between the Algonkin stock and the Cherokee and cognate tongues, and in investigating the Tutelo language, he discovered that it was the oldest form of speech in the Dakotan family. As the original habitat of the Tuteloes was in Carolina, it follows that the whole Dakotan stock came from the *east* of the Mississippi. This opinion has lately been strikingly confirmed by the investigations of the Rev. I. Owen Dorsey amongst the tribes of the Siouan family. He observes: "Some authors speak of a series of migrations of these Siouan tribes from the west towards the east, but the author has been unable to learn upon what authority such statements have been made, nor has he ever found any tradition of such eastern migration among the tribes which he has visited." . . . . . . Ages ago the ancestors of the Omahas, Ponkas, Osages, Kansas, Kwapas, Winnebagoes, Pawnee-Loups, and Rees, dwelt *east* of the Mississippi. They were not all in one region, but they were all allies, and *their general course was westward*" (Migrations of Siouan Tribes, Amer. Naturalist, March, 1886). Thus from the Mississippi to the Atlantic, and from Labrador to Florida, careful study has shown a general affiliation of speech to exist (the relation in many cases it not easy to discern, but enough has been shown to prove that it does exist). It is probable that a like application in other regions will produce a like result. Neither from the languages nor from the traditions of the Indians of this vast region does the theory of Peninsular Asiatic origin gain support, and the same may be said of their mythology.

In dealing with questions of mythology, some writers have gone to the extreme of deriving all known phenomena of this kind from one source. But too much attention cannot, I think, be paid to those phenomena which are manifestly the product of the "working of like minds in a like state of culture." The disregard of this has led to many curious, and sometimes most absurd, views as to the origin of some of the peculiar features of the customs and mythology of our American Indians. Here let me cite a case in point. Among certain tribes of northern Asia the "hare" appears frequently in their mythology and folk-lore. In the great Algonkin family we find the myth of the "*Great White Hare.*" In this apparent coincidence the advocates of an eastern Asiatic origin would find a striking proof of the truth of their theory. But when we examine into the matter we find that it is a "myth of the dawn," as Max Müller would term it; and from this as a basis the myth of the "Great White Hare" has grown in the following manner:—The words for "hare" and "white" in the Algonkin dialects are in many cases evidently the same at bottom, *e.g.*:—

Chippewa—*wabos*, hare; *wawbishkaw*, white.
Menomonee—*wawpos*, hare; *waubish keewah*, white.
Miami—*wapawsuoh*, hare; *wapekinggek*, white.

The words for "*white*" in old Algonkin, Micmac, Penobscot, Etchemin, Abenaki, Bethuk, Cree, Massachusetts, Mohican, Nanticoke, Narragansett, Montaug, Pampticoe, Saukie, Sheshatapoosh, Squallymish, &c., are all from this same root. Thus, instead of an imported myth from Asia, we have a "language myth" grown up amid the Algonkin family. The transition from the *white of the dawn* to the *white hare* is easily understood, and the result is the myth of the "Great White Hare," Michabo. And I have no doubt but that in our study of American mythology we shall meet with many of these language-myths for which no other satisfactory explanation can be given.

Mr. Horatio Hale suggests that the foreign element of the Cherokee language may have been derived from the speech of the ancient "Mound-builders." He bases this view upon the fact that the Choctaw and Cherokee, "though differing in the more common words of vocabulary, agree in quite a number of terms which seem likely to have been borrowed." Dr. Brinton suggested that "the Mound-builders were in part the progenitors of the Chahta tribes." Robertson, the historian, considered the Otomis to be their present representatives. Frost (North-Americans of Antiquity, 1882,) sums up the evidence in favour of their identity with the Nahuas; others have connected them with the Natchez. The best authorities regard their civilization as essentially American.

Prof. Campbell, in several papers read before the Institute in favour of the Peninsular Asiatic origin of American peoples, claims that the "Mound-builders" were "*Hittites.*" The weight of his arguments rests upon the facility with which (he says) the "mounds" can be traced from the "Tels" of Syria *via* Behring's Straits to the works of those ancient settlers in the Ohio valley; upon the alphabet derived from certain inscribed stones alleged to be genuine relics of the Mound-builders of America; and upon certain topographical and linguistic arguments to which I shall refer later. In a communication to the writer a few weeks ago, Dr. D. G. Brinton says:—"I would suggest that the 'Mound-builders' were probably not one but many nations, and may have belonged to quite different stocks. The time has past when they should be looked upon as a single tribe or nation. As to the origin of any one of the 'Mound-building' nations, I think it is premature to express any opinion; we have not sufficient data." Respecting the inscribed tablets Dr. Brinton says:—"With regard to the inscribed stones you mention (the Grave Creek, Brush Creek, and Davenport stones), I personally consider them all frauds and utterly unworthy of consideration. I have not been hasty in this conclusion, but have reached it after conscientious examination." Coming from one whose thorough research and calm and unprejudiced spirit of investigation have placed him in the foremost rank of Americanists, this effectually disposes of the first two branches of Prof. Campbell's argument. The last, as will be seen, rests upon evidence still less trustworthy. I prefer, then, to see in this ancient people a nation (or nations), with a culture essentially American, and not a horde of quasi-civilized intruders from Syria. Too much, I am convinced, is being made at present of these "Hittites;" and when we are in possession of all the facts in the case, I think it may possibly turn out that the Hittites were not the wonderful and ubiquitous people that some writers would have us believe they were. The question whether the "Mound-builders" came into the Mississippi from the north or the south has not yet been satisfactorily settled. There are evidences which point in both directions; and may they not both be right in the light Dr. Brinton has suggested? The existence of mounds in the far North-West has been held to be an evidence of migration from that direction. The fact that there are mounds in Brazil bearing a remarkable likeness to those of the Ohio valley has lately been pointed out by M. Netto (Archivo do Museo nacional do Rio de Janeiro, Vol. VI., 1885), and certain objects held to be of southern origin, or as indicating such origin for those whose handiwork they were, have often been found in the mounds of the Mississippi valley. But such objects may have been obtained by commercial interchange, and the South American mounds may be of independent origin, or perhaps the work of refugees who fled from the north after the defeat of the "Mound-builders" and their dispersion. Perhaps the best view of the matter is that the "Mound-builders" were a vast confederacy, similar perhaps to the great league of the Iroquois, or to the combination which existed between the kings of Mexico, Tezcuco, and Tlacopan, in the time of Montezuma. This league may have consisted of many tribes, and the art of mound-building may have been a foreign graft from more southern peoples; but this is doubtful.

Many writers have professed to see in the Pueblos Indians of New Mexico the modern representatives of the old Mound-builders. If this be true, the Mound-builders must have spoken a dialect akin to some of the numerous Athapascan languages, or these survivors of that ancient people must have adopted such a language instead of their former tongue. For a comparison of the Pueblos dialects (Tesuques, Jemez, Zuni, &c.) with the Navaho, Xecorilla, Apache, and other languages, with Athapascan affinities leads to this conclusion. It may, as Mr. Hale suggests, be philology which will finally settle the much vexed question of the origin of the peoples known as Mound-builders.

Our present knowledge is not sufficient to entitle us to speak with certainty regarding the origin of the numerous tribes who occupied the Pacific coast from California to Alaska; it is very probable that a great mixing has taken place here, and only long and careful study of these languages can aid us in solving the question of their origin.

We now turn to the populations of Mexico and Central America. Since the day when Father Duran in 1585 expressed the opinion that they were the Lost Ten Tribes of Israel, human ingenuity has been almost exhausted in suggesting possible origins for these interesting peoples. It is needless, perhaps, to observe that all theories which make their civilizations a late importation from the Old World are gradually being abandoned and cast aside. Prof. Campbell, however, comes to the conclusion that the Aztecs were Hittites, and brought their hieroglyphs from Syria. Let us consider the Mexicans first, as the Maya-Quiches are evidently a people of much greater antiquity. A recent writer says:—"The movement by which in a remote antiquity, the peoples of Central America ascended towards the north, carrying with them their relative civilization to Mexico and beyond, was reversed at the epoch of our middle-ages by a migration in the opposite direction, and it is probably to invasions of this description that we must ascribe the fall of the Maya civilization of the isthmic region" (Dr. A. Réville, Native Religions of Mexico and Peru, p. 20). The traditions of the Aztecs have been held by many to betoken an Asiatic origin; but they are much corrupted and bear in many cases evidences of Spanish influence. The prevailing view is that the Nahua nations came from the north-west, the Huehue Tlapalan being held to be the region round the Rio Colorado. Buschmann, it is true, has pointed out traces of the Aztec in the languages of the Pacific coast, and it seems to me that there are similar traces in the language of Kamtschatka; but all these are best explained (they are but faint) by migrations from the primitive Aztec seat in America, rather than by making the Aztecs a colony from Asia. Some recent writers have held with some show of reason that the Nahua tribes came from the east; in fact some of their oldest traditions point to the north-east as the point of origin. With regard to the Aztecs I am inclined to connect them with the northern tribes of America, with whom their language shows them to have been related; and it is rather curious that some of their legends represent their forefathers as coming from a land of sandy wastes strewn with bowlders, which seems to point to a northern region; besides, Aztlan (the white land) may find its explanation here, as may also Huehue Tlapalan (the old red land), though it seem at first contradictory of the former. A linguistic chain of evidence seems to connect the Aztecs with the Athapascan tribes, but their later development seems to have taken place in the valley of the Gila and Colorado.

Much has been written on the relations of the civilizations of Mexico and Central America; the prevailing veiw being that though the Mayas preceded the Mexicans, the civilization of the latter shows an independent origin in many respects. The traditions of the Mayas point to the east as the region whence their forefathers came to America; and their antiquity precludes all possibility of a recent origin from Asia. But it is in the philology of Mexico and Central America that we find the strongest evidence against such an origin. The pictorial (or as Zelia Nuttall would have it, the phonetic) writing of the Aztecs, and the phonetic, perhaps even alphabetical, system of the Mayas, bear upon them the proofs of their essentially American origin. Speaking of the phonetic aspect of some of the Mexican writings Tylor says "There is no sufficient reason to doubt that this purely phonetic writing was of native Mexican origin" (Early History of Mankind p. 96). And the ablest writers upon the subject agree that the Maya system of writing is of independent growth, and not an importation from the Old World. The length of time requisite for the development of the sixteen languages of the Maya-Quiche family must take us back to a vast antiquity; add to this the period necessary to allow the development through its various stages of the Maya phonetic system, and we reach an age in the primeval past that may vie with the most ancient civilizations of the other hemisphere. When we read that from five cities alone on one occasion the Spanish governor obtained no less than 16,000 volumes or scrolls, it is but reasonable to suppose that America had a literature as well as an alphabet; and we impatiently wait for the appearance of the American Champollion who shall unlock for us the stone records of Palenque and Copan, and read for us the few volumes of ancient American history that priestly intolerance has permitted to escape the flames. That late migrations from Asia have had any appreciable effect (if they ever took place at all) upon American civilizations, I do not for one moment believe.

Dr. E. F. Hamy lately (Nov. 9th, 1886) read a paper before the Anthropological Institute "On an Interpretation of one of the Copan Monuments," in which he claims to have found upon one of the stone figures at Copan, the Chinese sign Tai-Ki; from this he obtains "fresh proofs of the influence of Asiatic upon American civilization." Referring to such views in terms of disapprobation, W. H. Dall says (in Science Nov. 5th 1886): "We believe that the very wide hypothesis thus broached (*i. e.* of early Chinese voyages to America) and which in one form or other has had a certain currency for more than a centuary, rests upon a totally insufficient basis. . . . . Mr. Wolcott Brooks informed me that he had patiently searched into the matter, and that he had conclusive evidence that the voyage which actually took place was one to the well known and still existing province of Fusang in Corea (see Griffis' work) and had no connection whatever with America." Some have professed to see philological evidence of the Asiatic origin of the Otomi, an alleged monosyllabic language, which Senor Najera (Disertacion sobre la lengua Otimi 1835 p. 87) has compared with the Chinese. But Dr. Brinton has pointed out many evidences in this language of the prevailing American polysynthesis; and there is nothing improbable in the fact that a close resemblance to a monosyllabic language should develop itself upon the continent of America, as we find similar approaches to such a state amongst certain languages of Western Africa, where purely monosyllabic tongues are unknown.

With regard to the relations of the multitude of languages in South America, we have not the same light to guide us as in North American philology. Most writers, however, have seen fit to discern at least four different stocks, viz.: the Muysca, Quichua-Aymara, Carib-Tupi, and Araucanian. The two former of these seem to have developed considerable civilization; the Quichuas having attained a degree of culture which in point of antiquity can only be compared to the Maya of Yucatan. Bochica, the culture hero of the Muyscas, is represented as having come from the east; as did also Tupi and Gurani the twin progenitors of the Carib-Guarani tribes. The legends of Peru are said to bring the Incas from over the Pacific; but the best authorities regard their civilization as but a further development of primitive Aymara culture, and not a foreign graft. That these people must have reached Peru at a very early period is evident from the fact that no clear proofs of connection between the civilization of Peru and Central America have ever been made out; a portion of the primitive American stock early reached the Andean region, and there developed their peculiar civilization, without the advent of Zinghis Khan's grandson, or of Buddhist priests from China, or shipwrecked sailors from Japan.

With regard to the Quichua-Aymara language speculation has been rife. Dr. Lopez, of Monte Video, has claimed for it an Aryan origin (Les Races ariennes du Pérou par Vicente Fidel Lopez, 1871); and the Rev. Prof. Campbell (Proc. Canad. Instit., 1881, Vol. I., Pt. 2, p. 189), styles it the "pre-Aryan Celtic," whatever that may mean. Dr. Ellis would derive it "in common with the other American tongues from Central Asia" (Peruvia Scythica, 1875). The last two writers note its resemblance to the Basque.

What the relations of the Araucanian family are has not yet been satisfactorily settled. Prof. Campbell claims the Fuegians (a branch of the Araucanian stock) as members of his "Khitan" family and immigrants into America from Asia. Mr. Hyde Clarke claims to have discovered a relation between the Fuegian and certain languages of South Africa. He says:—"It is sufficient to state that these gelations enter into a definite group, No. VIII. of Dr. Koelle's Poly-Metta Africana, and bear a notable resemblance to the Ngoten and Ekamtufulu languages. How such relations can exist between Tierra del Fuego and South and West Africa, others may explain. My own conclusions have often been made public" (Journ. Anthrop. Inst. of Gt. Brit. and Ire., Nov., 1885). The existence of a primitive Negroid people at the southern extremity of South America is not very improbable. If Mr. Hyde Clarke's views be correct, the relation of the Araucanian proper and the Pampean families to the Fuegian will be of great help in solving the problems of South American ethnology.

But it is in Brazil and Guiana that the philologist and the ethnologist alike are puzzled. The multitude of languages in these regions bewilders the investigator, but it is quite likely that proper study and application will prove (as has indeed been tacitly assumed by most writers) that they have all (or nearly all) sprung from the primitive Carib-Guarani stock. Lang (Polynesian Origins and Migrations), comparing certain languages of Polynesia and Guiana, would bring the Polynesians to America, and the contrary theory has been held by not a few.

A recent writer, M. Peixoto (Archivo do Museo nacional do Rio de Janeiro, Vol. VI., 1885), arrives at the conclusion that "no type yet examined in Brazil presents the essential characteristics of a race; a great mixing has been long going on among South American peoples; the plastic forms of the primordial factors in the mixture have long ago disappeared in the general fusion." The resemblance in manners, customs and mythology of the Botocudos, Suyas, Yaruras and other Brazilian tribes to those of certain African peoples has often been noticed. It is possible that the ancestors of the Mosquito Indians of Central America, of the Caribs of the West Indies and the coasts of Venezuela and Guiana, and of some of the Brazilian tribes, may have crossed over from Africa at a time when the African Islands in the Atlantic were connected with that continent, and when the West India Islands projected much farther to the eastward than is the case at present. Mr. Horatio Hale suggests that it would have been easy for a people using the immense canoes, from time to time dug up in Britain and Ireland, to cross the Atlantic with favouring winds; and is inclined to find in this the origin of the Iroquois and other North American peoples, as well as the Caribs of the West Indies.

Up to the present no one has been able to show any marked connection between the languages of North and those of South America; and as the time of their separation from a common stock is so remote, we can hardly hope that very many marked resemblances will ever be found, for among the "Turanian" languages the divergence or vocabulary is remarkable when compared with that among the Semitic or the Aryan tongues. Still I believe that careful study will in time reveal those few and important connecting links which one cannot but think exist between many languages of North and South America.

Having thus briefly reviewed our present stock of knowledge, I now return to the general question of the origin of the American peoples and languages, with a view to assigning them a trans-Atlantic origin. Prof. Whitney has said:—"The Basque forms a stepping-stone from which to enter the peculiar linguistic domain of the New World, since there is no other dialect of the Old which so much resembles in structure the American languages" (Life and Growth of Lang., p. 258). And some relation between the two is admitted by most writers on philology.

With regard to archæology, I quote Prof. Boyd Dawkins:—"We have therefore proof that an Iberian or Basque population spread over the whole of Britain and Ireland in the Neolithic age, inhabiting caves, and burying their dead in caves and chambered tombs, just as in the Iberian Peninsula, also in the Neolithic age" (Cave Hunting, p. 24). Now, notwithstanding the wide currency of the Finnic hypothesis as promulgated by Rask, I am inclined to believe that the Basques or the brown race, rather than the Finns or Lapps of the yellow or Mongol race, represent to-day the pre-historic Europeans. Carl Vogt is of opinion that the Basques cannot have come from Central Asia; and Dallas proposes Europe as the scene of the origin of the Mongolian tribes, whence, he says, they may have reached Asia by way of America (Dallas on Distrib. of Races, Journ. Anthrop. Inst., Vol. XV., No. 3). There are, however, many objections to Europe having been the primitive home of the so-called Mongol peoples. The Basques are not truly a Mongolian or Turanian people in the accepted sense of these terms. It is in the brown race that created the civilization of the Nile, and whose extraordinary culture meets us on the banks of the Euphrates, that the Basque finds his nearest congeners; the Finns and Lapps are later and ruder developments from the same stock on another continent, the continent of America.

In the dim past of antiquity, a branch of that same primitive stock, from which the Basques, Egyptians, and earliest settlers of Accad are descended, crossed over from Europe to America, at a time when land connection between north-eastern America and Western Europe *via* Greenland, Iceland, and the Faroes, still existed. Other migrations may have taken place across the ocean, or by the sunken Isle of Atlantis, from Western Europe and Northern Africa.

It is from the race that produced the civilizations of Egypt and Accad, rather than from the wandering Mongols of the Siberian steppes, that I would seek to derive that race whose culture we see in the valley of the Ohio, on the shores of lake Tezcuco, at Palenque, Uxmal and Copan, and on the slopes of the Andes in Peru. The "Mongol" race so termed I regard as a subsequent development, starting from American soil, of the same primitive stock; spreading by Behring's Straits into Asia, and thence into Northern Europe; having since their departure from America separated into numerous petty tribes and undergone many and extensive changes in their languages.

The following comparative list will I think bear out the reasonableness of the views I have advanced; as has been often remarked, however, we cannot look for very striking evidences of community of origin amongst the members of a stock which has been so widely dispersed, and that, too, in the remote past. But subsequent study will, I hope, reveal the true state of the case to be much as I have stated it to be.

COMPARATIVE ESKIMO-TURANIAN VOCABULARY.

ENGLISH.	ASIATIC (NORTH ASIATIC).	AMERICAN (ESKIMO).
axe	galgate (*Koriak*)	algatta, kalkalima (*Tchuktchi*)
belly	ksuch (*Kamtschatka*)	aksheka (*Tchuktchi*)
black	kad, katte (*Samoied*)	kakshikluli (*Aleutan*)
	kacth (*Lapp*)	kahchehzeek (*Unalaskan*)
boy	oongua (*Loo Choo*)	einyook (*Kotzebue Sound*)
brother	aki (*Tungus*)	agituda (*Aleutan*)
cold	iyich (*Ostiak*)	ikkee (*Hudson's Bay*)
	kai (*Samoied*)	keja (*Greenland*)
day	hallug (*Kamtschatka*)	ullit (*Greenland*)
	halui, halo (*Koriak*)	
	tjeld, tell, telga, jalle (*Samoied*)	
	yeld, dialle (*Tawgy*)	
	jalakas (*Lapp*) [light], chald (*Ostiak*) [sun]	
dog	kanak (*Samoied*)	kelmeg (*Hudson's Bay*)
		keuma (*Kotzebue's Sound*)
		kymyk (*Tchuktchi*)
duck	galle (*Koriak*)	galgagalachi (*Tchuktchi*)
ear	schen (*Tungus*)	schijun (*Kadiak*)
	kus, ku, chau (*Samoied*)	heeutinga (*Hudson's Bay*)
		suit (*Greenland*)
		tschintak (*Tchuktchi*)
earth	na (*Tungus*)	nuna (*Greenland, Hudson's Bay, Kadiak*)
		nunna (*Tchuktchi*)
egg	muni (*Samoied*)	mannig (*Hudson's Bay*)
	muna (*Finn*)	manik (*Mackenzie River*)
	munua (*Esthonian*)	mannik (*Kotzebue's Sound*)
	muno (*Tcheremiss*)	
	monn, muni (*Wogul*)	
eye	eha, esha, ihseh (*Tungus*)	eieega (*Hudson's Bay*)
	hai (*Samoied*)	iik (*Tchuktchi*), iyik (*Mackenzie River*)
		irsik (*Greenland*)
father	atja (*Samoied*)	atta (*Tchuktchi*)
	etcea (*Yukagir*)	attak (*Unalaskan*)
	achai (*Sojot*)	athau (*Aleutan*)
finger	gyhgek (*Kamtschatka*)	tikkiek (*Hudson'ss Bay*)
	tarka (*Samoiod*)	tegheya (*Kotzebue's Sound*)
	tarka (*Finn*)	tirkerit (*Greenland*)
fish	kalla, kual (*Samoied*)	ekkaloo (*Hudson's Bay*)
	kala (*Finn*), kole (*Tawgy*)	khalloo (*Kotzebue's Sourd*)
	kal (*Hungarian*)	ssaljuk (*Tchuktchi*)
	kalmach (*Suanic*)	
	guolle (*Lapp*)	
	olla (*Tungus*)	
	olloga (*Yakagir*)	
	xul (*Ostiak*)	
	ennen (*Kamtschatka*)	annegui (*Tchuktchi*)
fire	ku (*Yeneseian*), agoime (*Yakut*)	ikkooma (*Hudson's Bay*)
great	agga (*Samoied*)	kaaguk (*Tchuktchi*)
hair	nyurrit, nurikteh (*Tungus*)	nyakka (*Hudson's Bay*)
	tenge (*Yeneseian*)	niyet (*Kadiak*)
		nujak (*Tchuktchi*)
		nuyak (*Greenland*)
		nuchet (*Kotzebue Sound*)
		tinge (*Greenland*)
hand	chkatsch, syttu (*Kamtschatka*)	tsax, tsha (*Aleutan*)
	kit (*Tcheremiss*)	eshet (*Kadiak*)
	giette (*Lapp*)	arkseit (*Greenland*)
	ket (*Ostiak*), kett (*Mordwin*)	tathchka ((*Tchuktchi*)
ice	cigu (*Koriak*)	tschikuta (*Tchuktchi*), ticku (*Mack. R.*)
	djuko, dschuche (*Tungus*)	sikkoo (*Hudson's Bay*)
	ser, sok (*Samoied*)	sermek (*Greenland*)
	seren (*Sojot*) [cold]	
lake	tuse (*Samoied*)	tessek (*Greenland*)
	teu (*Ostiak*)	tatcirk (*Mackenzie River*)
		touga (*Tchuktchi*)
live, life	inni (*Tungus*)	innuowoke (*Hudson's Bay*) [he lives], innuk (*Mackenzie River*)
mountain	naju (*Koriak*)	naigak (*Tchuktchi*)
man	chu (*Loo Choo*)	juk (*Tchuktchi*)
	chujakutsch (*Koriak*)	shuk (*Kadiak*)

ENGLISH.	ASIATIC (NORTH ASIATIC).	AMERICAN (ESKIMO).
man	khuyukutsch (*Koriak*)	chojatschin (*Tchuktchi*)
	ennete (*Samoied*)	innuk (*Greenland*)
	innimene (*Esthonian*)	innueet (*Hudson's Bay*)
moon	jailgat, gailygen (*Koriak*)	yaalock (*Kadiak*)
mother	anguan, aingga (*Kamtschatka*)	anaan (*Aleutan*)
	angnan (*Koriak*)	anaha (*Kadiak*)
	amma (*Samoied*)	amama (*Greenland and Mackenzie River*)
	ama (*Yeneseian*)	annak (*Unalaska*))
	anga (*Ostiak*)	anana (*Mackenzie River*)
	enie, ani (*Tungus*)	
mouth	zehylda (*Kamtschatka*)	aghilga (*Aleutan*)
	khan (*Yeneseian*)	sheelrek (*Unalaska*)
	angya (*Yukagir*)	kannek (*Greenland*), kanok (*Kadiak*)
nails (finger)	chada (*Samoied*)	shetooe (*Kotzebue Sound*)
	kad (*Ostiak*)	setunka (*Tchuktchi*)
	kacth (*Lapp*)	kukek (*Mackenzie River*)
night	nygynok (*Koriak*)	unnuk (*Mackenzie River*)
	kyunnuk (*Kamtschatka*)	unjak (*Kadiak*), unjuk (*Tchuktchi*)
		oonooak (*Hudson's Bay*)
nose	kaankang (*Kamtschatka*)	kinaga (*Kadiak*), kingak (*Greenland*)
	hang (*Yeneseian*)	kingara (*Huds. Bay*), kingar (*Kotz. Sd.*)
	joonul (*Yukagir*)	chinga (*Tchuktchi*), krenyark (*Mack. R.*)
	enku (*Koriak*)	ankozin (*Unalaska*), anghosin (*Aleutan*)
rain	tshukutshi (*Kamtschatka*)	tshutakat (*Aleutan*)
		chehtak (*Unalaskan*)
red	cholachin (*Tungus*)	kawychly (*Kadiak*), kakluk (*Tchuktchi*)
river	gozem (*Koriak*)	koo (*Hudson's Bay*), koouk (*Kotz. Sd.*)
	gychi (*Kamtschatka*	kuik (*Greenland*), kuuk (*Mackenzie R.*)
	kiha (*Kamtschatka*)	kuik (*Kadiak*)
sky	kochall (*Kamtschatka*)	kulak (*Tchuktchi*)
snow	char (*Sojet*), char (*Yakut*), qar (*Turk*)	sermek (*Greenland*) [ice]
	anighu (*Koriak*)	annu (*Tchuktchi*), annju (*Kadiak*)
		kannenk (*Hudson's Bay*), anniyo (*Mackenzie River*), kanneek (*Aleutan*)
stone	wrhaugon (*Koriak*)	ujarak (*Greenlond and Mackenzie River*)
	guwwen, gugun (*Koriak*)	ooyarra (*Hudson's Bay*)
	hyma (*Tungus*)	yamak (*Kadiac*)
	kiwwi (*Finn*), kaw (*Mordwin*)	kooooanak (*Unalaska*)
	kow (*Wogul*), koeb, kug (*Ostiak*)	
sun	schigun (*Tungus*)	sukkenuk (*Hudson's Bay*)
	ziguni (*Tungus*)	shekenak (*Tchuktchi*)
	hajur, chaja (*Samoied*)	ajut (*Greenland*), agadak (*Radiac*)
	xat (*Ostiak*)	tchikreynerk (*Mackenzie River*)
	tykete (*Koriak*)	tekkinek (*Labrador*)
	tirgani (*Tungus*) [day]	tirkiti (*Tchuktchi*)
tongue	onnior (*Yukagir*)	ahnak (*Unalaska*), aghnak (*Aleutan*)
	njuoktem (*Lapp*)	agonok (*Kadiak*), ukrark (*Mackenzie R.*)
tooth	kuppet (*Kamtschatka*)	kiutit (*Greenland*), keuteet (*Huds. Bay*)
	tody (*Jukagir*)	kootay (*Kotzebue's Sound*)
	tjiw (*Jurak*), tji (*Jeneseian*)	gutyk (*Tchuktchi*), chudyt (*Kadiak*)
	ikta (*Tungus*)	kigut (*Mackenzie River*)
water	mu (*Tungus*)	mooe (*Kadiak*)
woman	heghe (*Tungus*)	aganak (*Kadiak*), aganach (*Tchuktchi*)
	innago (*Loo Choo*)	anhahenak (*Unalas.*), anrenak (*Mack. R.*)
one	dyshak (*Kamtschadale*)	attausek (*Greenland*)
	dizi (*Loo Choo*)	adaitsuk (*Kotzebue Sound*)
	akte (*Lapp*), yksi (*Finn*)	atoken (*Unalaska*)
	otik (*Syrjän*), ikta (*Tcherem*)	attakon (*Aleutan*)
three	ilan (*Mandschu and Tungus*)	illaak (*Mackenzie River*)
four	tjiet (*Jukag. and Ost.*) [(*Kamaas*)	tsita-mat (*Mackenzie River*)
	tjata (*Jurgy*), teto (*Jenes.*), thede	tsetumet (*Kotzebue Sound*)

As regards the grammar of many of the Turanian languages, many resemblances in structure to the Northern American languages have been pointed out, and it is not necessary at present to elaborate this feature of the case.

I do not, however, propose to derive the American languages from the Basque, believing that they are but sister branches of the same parent stock. To the Basque are intimately related the brown races of Africa (the Berbers, Foulah, Houssa), the old Egyptians and the pre-semitic Accadians. The migrations of these primitive Eur-African races into America must have taken place at a very remote period; it may be however that several distinct migrations have in course of time taken place. The routes by which they reached America were by land from Western Europe to Labrador and across the Atlantic (or over the isle of Atlantis) to Florida, the West Indies and South America. The earliest to migrate were probably the ancient Peruvians, (who may have reached South America while land connection between it and North America by the isthmus of Panama did not yet exist) the Maya-Quiches, and the ancestors of the Eskimos. Certain South American tribes probably migrated from Africa at a time much more recent.

At a very early period migrations to Asia must have taken place, the result being to develop the various Mongol tribes of Northern Asia and the Finns, Lapps and Esthonians of Europe. It may seem strange to attempt to derive the Japanese and Chinese from America. The philological relations of the Basque and Japanese, and the relations which the Japanese seems to bear to the Dakota and Cherokee-Muskhogee families can best be explained in this way. And a few coincidences can be noted between the Eskimo and the languages mentioned. A recent writer (Our Arctic Province Alaska, H. W. Elliott) would see in the Aleuts a connecting link between the Eskimo and the Japanese, and, though favoring an Asiatic orign for the Eskimo, he refers the migration to a very remote period. An American origin for the Japanese is just as reasonable. The Chinese have ever been a puzzle to the ethnologist; all we know of them is that they seem to have appeared first in the north; and to derive them also from America is as satisfactory as the solutions of the problem which have hitherto been proposed. It may be objected, that to derive the American aborigines from Africa or Europe would not give sufficient time for their early spread into Asia and the development of their civilizations in America and Asia. But the existence of an Iberian race in Europe in the Neolithic age is conceded; and the brown race [one of whose representatives, the Foulahs, are described by Mollien (Voyage en Afrique 1818 vol. 1 p. 275) as "redskins and nomads" (hommes de couleur rouge et des nomades)] have dwelt in Northern Africa from time immemorial.

Barth says that the relations of the Peulhs (Foulahs) carry us back to an antiquity prodigiously anterior to the domination of the Pharaohs (see Crozal Les Peulhs, p. 268), and the date of the disturbance of the primitive negro people of Africa by the ancestors of the Peulhs etc., is fixed by F. Mueller at about 6000 B. C. It is to a people boasting an antiquity like this that I would seek to attach the ancestors of the aborigines of America. Prof. Anders Retzius, from a comparative study of crania of the ancient Caribs of the West Indies and of the Guanches of the Canaries, unhesitatingly came to conclusion that these two peoples were closely related; and the Guanches belong to the great brown race of Northern Africa and it is probable that many South American tribes cause the same way as the Caribs did from Africa to the northern coast of that continent.

It has been attempted to derive some of the American peoples from Asia by reason of an apparent similarity in tribal names and names of rivers, mountains etc. This is a very dangerous ground to tread upon; and random comparison is worse than useless. For example "Koriak" and "Cherokee" have been thus co-related. But "Koriak" is from a word "Kora" (cp. Tchuktschi "Korang") meaning "rein-deer," and can have no possible connection with "Tshelaki" the name of the Indians here mentioned. The names "Yuma" and Yemez have been connected with "Yamato," "Himalaya," "Haemus" and "Hamath." "Yum-a" according to H. L. Pinart (Zeitschrift für Ethnol, 1886, Heft III.) is a borrowed word, being applied to the Yuma Indians by the Pima tribe, and its signification is probably the same as we find in other cases of tribal nomenclature where the name is of foreign origin. "Himalaya," according to the best authorities, means "abode of snow" in Sanscrit, and the related word "Haemus" (and "Himalaya" as well) is clearly explained by Pliny, (Imaus incolarum in lingua nivosum significante). In tracing the alleged migrations of the Hittites or Khitai into America much use has been made of topographical resemblances. The river-name *Songala* has been connected with *Saghalien* (island) and *Sangar* (sts). Now the meaning of *Saghalien* is easily seen; the native name is "*Saghalin anga hada*" "isle of the black mouth" *i. e.*, the island at the mouth of the "black river," the Amur, the native name of which is "*saghalinula*" (black river). The same word is seen in the Tungus "sachalin," black. Now it is altogether unlikely that *Songala* means the "black river" or *San*-

gar the 'black strait.' The primitive meaning of *Hamath* is probably the very opposite of *Haemus* and *Himalaya* (snowy, white,) being most likely the same as *Ham*, *Khem*, "the dark one, the black one" (see I Chron. ii., 55).

Bunbury (Hist. Anc. Georg., 1879, Vol. I., p. 505, note) states that the resemblance of the name of the "*Cathaei*" of the Punjaub to the name "*Cathay*" is purely fortuitous. With regard to the "*Kitai*," Dr. Gustav Oppert says:—"The home of the Kitai is to be found in those mountainous regions in the north of Corea, whence all the rulers of China descended to the plains, as in later times did the Niutche and the Mandju" ("The Kitai and Kara-Kitai," Journ. Anthrop. Inst., 1869–70, Vol. II.). So if the *Khitai* and the *Hittites* are one and the same people, they, along with the rest of the Mongols, may have come over from America. Prof. Campbell, in his papers on "Asiatic Tribes in America," has endeavoured to connect the Ainos and certain American tribes in respect to their languages, and the inference to be drawn from his remarks is that the Ainos are Mongols. But Scheube (Die Ainos, p. 3) says:—"I cannot discover the Mongol type in the Ainos;" and D. P. Penhallow (Canad. Record of Science, 1886, Vol. III., No. 2, p. 128,) concludes an article upon these interesting people with the remark that "the prevailing view is that they are distinctly Aryan." Dallas (Journ. Anthrop. Inst., Nov., 1885,) says:—"There seems to be now no doubt that the language of the Ainos has not the slightest affinity with the languages of the neighbouring Mongolian races." It may be that they are an Aryan tribe that has adopted a non-Aryan language; their connection with the American Indian has not, I think, been proved.

The topographical evidence by which Prof. Campbell would connect the Hittites with America does not, after careful examination, bear the construction which he puts upon it, and the philological evidence which he adduces seems to be singularly unfortunate. In his paper "On Some Phonetic Laws in the Khitan Languages," he claims to have discovered a sort of Grimm's law amongst the so-called "Khitan" tongues. It cannot be admitted that he has proved the existence of such a law. *A more complete knowledge of the various American languages in themselves is necessary before such extensive phonological rules can be laid down.* The Basque *hilargia* (moon) is compared with the Iroquois *kilanquaw* (sun, moon). Now the derivation of *hilargia* is *il-argi* (light of the dead), not a strange appellation for the earth's silent and lifeless satellite [cp. the Algonkin *nipa* (moon), *nip* (I die), *nipua* (dead)]; but *kilanquaw*, being applied to both sun and moon, can never have meant "light of the dead." The Basque *biloac* (Lat. *pilus*), *ezurra* (Latin *os* with a Basque termination), and *kharrika*, are of Latin or Romance origin, and cannot possibly be related to any American words. *Curcira* (thunder) is probably onomatopoeic, as we find in Basque another word *ortzanz* (cloud-noise). Comparisons based upon these words must therefore fall to the ground. The Aino *kunezu* (moon) is in no way related to the Basque *hilargia*, being probably a corruption of *kane-nozu* (night-star). The case for the eastern Asiatic origin of the American peoples rests too much upon apparent phonetic resemblances, such as those I have just pointed out. Before any law like that of Grimm can be discovered and demonstrated between the American and related linguistic families, a thorough understanding of the relations which exist between the individual members of each branch of the American stock is requisite and of paramount importance.

The President read the following paper by Rev. Dr. McNish, of Cornwall, on "The Language and Literature of Brittany."

These remarks regarding Brittany occur in the last edition of the Encyclopædia Britannica: "Brittany, Britanny, or Britany, in French Bretagne, an ancient province and duchy of France, consists of the great north-western peninsula of the country, and corresponds very nearly to the present departments of Finisteire, Cotes-du-Nord, Morbihan, Ile et Vilaine, and Lower Loire. It is popularly divided into Upper or Western and Lower or Eastern Brittany. . . . . The Celtic language is still generally spoken, especially in Lower Brittany, and a considerable body of traditional story and song is current among the people." It is obvious that Britanny is identical with Britain, and that the etymology of the two words must be the same. The Bretons or inhabitants of Britanny give to their own country the designation *Breiz*—a word which corresponds with *brat.* Professor Rhys, of Oxford, in a somewhat elaborate discussion maintains that we are to discover in *Brit*—the first syllable in Britannia—*breth* or *brath*, and that in Irish *bratt* or *brat* means a cloth, a cloak, or a sail,and *brattan* a little cloak. "It would then appear that the word Brython and its congeners meant a clothed or cloth-clad people." "Who then," he asks, "were the people whom the Brythons did not consider cloth-clad, or properly clad? They could hardly have been Celts of any kind, as the art of making cloth of some sort was known even to the earliest of them that ever landed here. They were probably some of the aboriginal tribes whose country they, *i.e.* the Brythons, invaded on the continent."* The Bretons give to themselves the appellation *Breiziaded*, and to their language the appellation *Brézonek*. England has among them the name *Bro-Zaos*, *the Saxon land;* and France bears the name *Bro-Chals*, *the land of Gaul.* The word *bro* which is thus employed is the Gaelic *bree*, and is to be found in *bruthaich*, a hill. *Breiz veur* is the name which the Bretons apply to Great Britain. Their own province bears the name *Breiz vihan*. Upper Brittany is known among them by the designation *Breiz uchel*, or *Gorre vreiz;* and Lower Brittany by the designation *Breiz isel*, *Gmelled vreiz.*

The Welsh, the Cornish and the Breton form the Cymric family of the Celtic languages. *Armorica*, which is another name for Brittany, reveals its etymology at a glance, signifying as it does *a country that borders on the sea*, and exhibiting an unmistakable resemblance to the Gaelic words *air muir*, or *air a' mhuir*, *on the sea.* In Welsh, Brittany bears the name *Llydaw;* the people of Brittany are known as *Llydawiad*, and the language of Brittany is known by the designation *Llydawaeg.*

The Bretons and their language date from a very remote antiquity. Niebuhr thus writes:—"The Venetians were a Belgic tribe, and so, without doubt, were all the inhabitants of Lower Brittany, whose Cimbric character seemed so evident in the time of the Romans, when all the country round about was peopled by Gaels, that a late immigration from Britain was invented to explain it. The Celts occupied the extent of country from Lusitania in Spain to the country about the Tanais in the East. . . . . At an earlier period the Cymri inhabited a much greater part of Gaul. In Lower Brittany alone they maintained themselves against the invading Celts, while Normandy and the other countries were conquered by the Gael."†

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* Celtic Britain, pp. 207–210.

† History of Rome, Vol. 2, p. 522. Ethnography and Geography, Vol. 2, p. 304.

In his preface to his Dictionnaire de la Langue Bretonne, Le Pelletier, who expended twenty-five years on the study of that language, remarks "that it is perhaps the most ancient language among those that are spoken to day in the world." With the patriotic enthusiasm for which he was remarkable, Le Gonidec, who may appropriately be designated the Eugene O'Curry of Breton Literature, avers "that the greatest proof of the antiquity of the Breton language is that up to the present time no learned man has been able to make us reascend to its origin, and to show us its first steps and progressive march. It appears incontestable that the Breton language has had Asia for its cradle, and that from Asia it spread into Europe with the nations which have peopled this part of the world." It is stated on the authority of Heraclides that the person who carried intelligence to Athens of the destruction of Rome by the Gauls, related that Rome had been taken by a great host of Hyperboreans—a people who came over the icy mountains from the unknown regions of the north. Whether the Bretons belonged to those Hyperboreans or not, there can be no question that they and their language have the hoar and the honour of a remote antiquity on their side.

The physical configuration and the comparative remoteness of Brittany from the thoroughfare of human connections and migrations lead us to expect that the Celts of Brittany have been allowed to occupy their homes without much molestation. As it is *prima facie* probable, if not altogether likely, that the first Celtic occupants of Great Britain must have crossed at the Straits of Dover, and as there is abundant evidence that Celts at one time possessed the whole of France as well as the south-west of Europe, there is nothing unreasonable in the conjecture that the Bretons of to-day are the descendants of the earliest Celts that had their home in the western part of Europe.

In his tour through Brittany the famous Welsh scholar, *Carnhuanaux* the Rev. Thomas Price, thus writes: "If I were asked what language I was chiefly reminded of, by hearing the Breton spoken by the natives in conversation, I should say certainly not so much the Welsh as the Gaelic; and this from the frequent occurrence in the Breton, of a certain nasal pronunciation very much resembling that so frequently heard in the Highlands of Scotland."

Mr. Price remarks that Druidical remains can be found in greater profusion in Brittany, than perhaps in any other country whatever.

There is still existing in Morbihan a greater variety of those curious remains, than in all the British islands put together. This corner of Europe was the favourite resort of the Druids. Then this attaches to Brittany an unusual interest, owing to the numerous evidences which it presents of the manners and industry and peculiarities of the Druids; and it is also conceded that Brittany was the cradle of chivalry and romance, and that there some of the most essential materials of romantic fiction had their home. Owing to the political upheavals which obtained over several centuries in Great Britain, it might be expected that frequent interchanges took place between the Celts of England and their brethren in Brittany, and that communications of an intimate character must often have passed between them. Stephens, than whom there can be no more reliable authority, thus writes in his Literature of the Kymry (p. 402): "We must therefore seek the first traces of the Arthur of romance among Kymry of Armorica, and the people of Armorica, and of ancient Gaul generally, are supposed to have been the same people as the colonists of Britain, and this would seem to be the reason why, during times of distress, the Britons fled there for refuge, and the oppressions of the Picts led many more to leave the island; and after the Anglo-Saxons had entered A. D. 513, fresh bodies flew to Armorica, and settled in the Country of Vannes and Quimper, then called Lectavia, Littan and Llydew, and the conclusion is both legitimate and irresistible that the romantic Arthur is a creation of the Armorican Kymry." "The primitive people of the British isles," writes Le Gonidec, "who did not wish to submit to the yoke of the Saxons, fled into the mountains of the country of the Gauls . . . Another party of the insular Britons went to find an asylum in Armorica, because they knew well that they would find a friendly people and one that spoke the same language. Saint Mayloire followed the emigrants to the Armoricans; how could the Saint have been able to make the Armoricans understand him, if he had not spoken the same language that was in use in Armorica?"

The Celts of Brittany have accordingly many features of interest and of historical importance. The inhabitants of that portion of France exceeded two millions and a half in 1876. Le Gonidec stated in 1838 that no less than two million Bretons spoke the Celtic language of their native province. It must afford immense satisfaction to Celts, whose sympathies are either directly or indirectly connected with Great Britain and Ireland, that a dialect of their common language is spoken by a very large population on the continent of Europe. It is much much to be regretted that the literature of a people so ancient and so remarkable is not very extensive, and that but few fragments have come down to our times from a date that can be regarded as in any sense early or remote. In the article on Celtic literature in the last edition of the Encyclopædia Britannica, it is stated that Armoric like Welsh is a living language, but that no monument of the old form of the language exists. The relics of middle-Breton literature consist of two miracle plays, a prayer-book or "Hours," a dictionary and the chartularies of two monasteries. Of this small list only one of the plays and the dictionary are known to exist in early manuscript originals or copies. One of the plays bears the title *Buhez Santez Nonn*, or the life of St. Nonna. The other play is entitled *Bursud braz Jezus*, or the great mystery or miracle of Jesus, and consists of two parts, the "Passover and the Resurrection."

In his famous "Archæologia Britannica," which was published in 1707, Lhuyd inserted an Armorican Grammar and Vocabulary. In the preface to his laborious work Lhuyd states "that the Armorican Grammar and Vocabulary which have been mentioned, were written in French by Julian Manoir, Jesuit, about the middle of the seventeenth century, and published by order of the Bishop of Quimper. The author was one of the masters at the Jesuits' school in that town, and afterwards a famous missionary in *Bass Britany*. His vocabulary, though not very considerable, was yet, so far as I could learn, the most copious extant; and so scarce that 'twas my fortune to meet but with only two copies, and those in convents." There was published at Paris in 1752, an excellent dictionary of the Breton language by Dom Louis Le Pelletier, a Benedictine Monk. It is said that he expended fifty years in the preparation of his dictionary. Great ability and industry are perceptible in the work which cost so much indefatigable pains, and which must continue to be of very great service to the student of Armorican. Other works of more or less value in connection with the literature and language of Brittany might be enumerated.

Le Gonidec may fitly be regarded as the Eugene O'Curry of Armorican literature. In a notice of the enthusiastic Breton scholar, which is prefixed to a second edition of his Celto-Breton Grammar by Brizeux, the latter mentions that Jean-François-Marie-Maurice-Agathe Le Gonidec was born at Cinquet, a small harbour situated at the western extremity of Brittany, on the fourth September, 1775. He was not a stranger to the troubles which convulsed France towards the end of the last century. He rose to a position of eminence as chief of the foresters on the Rhine under Napoleon I. The overthrow of that Emperor's army at Moscow led to the loss of the lucrative situation which Le Gonidec held. He was compelled in his declining years to toil assiduously for his support. It has to be said to his credit that he continued faithful in his devotion to the language and literature of his native province. Brizeux justly observes that Le Gonidec can be called the restorer of the language and literature of the Celto-Bretons: Grammar, dictionaries and texts of language—his work embraces all, and his books, if dear to his country, are not the less recommended by their pure criticism to the learned of all Europe. Eleven years of wakeful hours, that were obtained after the daily and necessary labours for the support of his family were over, were given to the dictionaries, two years were devoted to the grammar, and ten to his admirable version of the Holy Scriptures. Three Armorican grammars were in existence before his Celto-Breton Grammar appeared in 1807. The grammars in question were La Grammaire Bretonne-Galloise, by Jean Daires, which appeared in 1621, the Grammaire Bretonne of P. Mannoir, which appeared about the same time, and the Grammar of P. Grégoire de Rostrenen, which was published towards the end of the seventeenth century. Le Gonidec's Breton-French Dictionary appeared in 1821. His French-Breton Dictionary must have been published about 1838. His translation of the New Testament, which Brezeux pronounces to be the most beautiful book of their language, appeared in 1827. Among minor translations which Le Gonidec made into Breton, is to be mentioned Thomas A. Kempis' Imitation of Christ.

So far as the value of the argument which can be drawn from the topography of any country is concerned, as to what language was spoken by its earliest inhabitants of any strength or permanence, there is much in the topography of Brittany to sustain the theory that Gaels who spoke the same language which is now spoken in the Highlands of Scotland, gave the names that the rivers and headlands and islands of Brittany still bear.

In the topography of Bretagne, accordingly, Gaelic roots are unmistakably present. The names of the rivers of Brittany disclose their Gaelic origin very readily, *e. g.* :

Loire, *luath*, fast, and *shruth*, *sruth*, a stream.

Loire corresponds with *Lora*, a name which frequently occurs in the poems of Ossian.

Sevre appears to be compounded of *seamh*, gentle, and *shruth*, *sruth*, a stream.

Vilaine seems to be the Gaelic *aluinn*, *excellent.*

Oust is the Gaelic *useje*, water.

Don is domhainn, deep, a *dubh black*, and *amhainn*, a river : *the black river.* The word *Don* occurs in the topography of the Highlands of Scotland.

Seiche appears to be related te *seacach*, fading.

Blauet, Blath, the Gaelic word for *warm*, forms the first syllable of *Blauet*. *Et* is *aite*, a place.

Daorelas is compounded of *dubh*, black, and *glas*, grey ; *Douglas*, a name which occurs in the topography of Scotland and of the Isle of Man.

Aff is *abh*, water.

The names of the rivers in Brittany which have been cited are Gaelic, and, therefore, are closely allied to the names of rivers in Scotland and elsewhere, where the Gael has had his home from a remote past.

Ros, *a cape* or *promontory*, is of common occurrence in the topography of Scotland and Ireland. It is to be found also in the topography of Brittany, *e. g.* : *Rosporder*, *ros* and *portair*, the ferryman's promontory.

Rostrenen, *ros trian*, a third part.

Roscoff, *ros* and *cobh*, a victory.

Rohan seems to be derived from *sruthan*, a streamlet.

Quimper is the Gaelic *cuimir*, elegant.

Penmarch is compounded of *pen ceann*, a head, and *mara*, *muir*, *mara*, the sea.

Quintin is closely allied to the Gaelic *cinntinn*, growing.

Arree Mount. In Arree *airidh*, a shealing seems to be present.

Auray is allied to *ora*, golden.

Antram is the Antrim of Ireland, *an druim*, the ridge.

Baird is the Gaelic *ban*, white.

Concarneau is a compound of *cu coin dag* or *cuan*, *ocean*, and *carn*, a heap.

Craon is the Gaelic *craobhan*, trees.

Douarnenez comes from *dubh*, black, *airne*, a sloe, and *eas*, a cataract.

Dol is akin to *dail*, the Gaelic word for meadow.

Dinan is the Gaelic *dunan*, a hillock.

Frehel, Gaelic *fritheil*,

Faon, Gaelic *faobh*, spoil.

Glenan, *gleannan*, a little glen.

Gourin may be *guerean*, a pimple, or *gobhan*, a goat, as in Gourock.

Guer is the Gaelic *gaoir*, a noise.

Lanmon. *Lan full* is the first syllable of this word.

In *Liosneven*, *lios*, a garden or fort is present. *Lios* enters largely into the topography of Ireland and Scotland.

Landernean seems to be a compound of *lan*, and *tighearna*, a lord.

Locmine is compounded of *loch*, a small lake, and *min*, soft or calm.

Londeac appears to be *lointean*, marshes, from *lon*, a marsh.

Mur signifies a wall or fortified place.

Muzillac is *muisealach*, *muiseal*, a muzzle.

Morlaix may be either *morluach* or *murlach*.

Angouleme is a compound of *ancon*. *Armorican* for dead, and *leum*, Gaelic, leap.

Ploermel is resolvable into *plorie* (arm), Gaelic *blar*, and *mel*, Gaelic *maol*, *bare*.

Redon is from *reidh*, smooth, and *dun*, a hillock.

In *Rennes*, the well-known Gaelic word *raon* is present.

Vannes is akin to *ban bhan*, white.

Ushant seems to pertain to the same root as *fhoiseneach*, *fois*, quiet, rest.

Morbihan is not unlike *Morbheinn*, the Mower of the poems of Ossian.

Morbihan may also be a compound of *mur*, a wall, and *beag*, small.

Cerfili is *cathair*, a seat, and *filidh*, a poet.

The topographical names which have been adduced are sufficient to indicate that Gaelic is the substratum of the topography of

Brittany, and that, accordingly, Celts, whose language was Gaelic, were the earliest occupants of any permanence in that portion of Europe.

In the extensive region of the Alps, in the South of France, and in Spain and Portugal, there survives in the names of streams, and headlands, and mountains, and passes, imperishable evidence that in the far off past, Celts who spoke Gaelic occupied that portion of Europe in sufficient strength and over a sufficiently long period to enable them to give those topographical names, which defy the change and commotions of nations and centuries. The argument which can be drawn from the topography of Brittany tends to corroborate the theory that so far, at least, as the Celts are concerned, Gaels or Celts who spoke Gaelic preceded the other members of the Celtic family in their occupation of Europe and Great Britain and Ireland.

SEVENTH MEETING.

Seventh Meeting, 18th December, 1886, the President in the Chair.

Exchanges since last meeting, 26.

A. Hamilton, M.D., and Rev. G. M. Wrong, M.A., were elected members.

Rev. Prof. Ferguson, of Queen's College, Kingston, read a paper on

THE ETRUSCAN QUESTION.

In January last, Professor Campbell, of the Presbyterian College, Montreal, read a paper before this Institute, in which he seeks to prove the affinity of the Etruscan with the Basque, and claims to have found the clue by which he is enabled to read the Etruscan inscriptions. It is an accepted principle that our only hope of deciphering and translating the inscriptions on the monuments of a nation that has passed away is by means of a bilingual inscription. It was in this way that the hieroglyphics of Egypt, and the cuneiform inscriptions have been read. Any other way than this must be hypothetical, and therefore unreliable, for, however ingeniously the researches may be conducted, we cannot accept the results with any confidence. Proceeding on this hypothetical principle it is quite possible, by a mere resemblance in the words, to show with great plausibility the affinity of a language, and consequently of a nation, with any other language or nation. We have not hitherto attached any importance to Professor Campbell's researches. Any attention we may have given to comparative philology has been because of its historical importance, and, if Professor Campbell derived any satisfaction from his Hittite or Aztec researches, we were not disposed to detract from that pleasure, for neither the Hittites nor the Aztecs have contributed much to the general development of civilization, and historically considered are unimportant nations. The Hittites had relations with Egypt during the Hyksos period, and during the reign of Rameses II., but they did not affect to any extent the progress of civilization. But Professor Campbell was treading very different ground when he entered the field of Etruscan research. The Etruscans were a very important people. They at one time occupied the greater part of the Italian peninsula, and largely influenced Roman civilization. They had extensive commercial relations with the inland countries of Europe, and with the Baltic. They have been regarded as foreigners on Italian soil, and there has been a very strong desire to read their numerous inscriptions, and to trace their affinity with other nations. It is more than half a century since Niebuhr said that he would willingly give half of what he possessed, if he could possibly obtain a clue to the deciphering of the Etruscan language, but he had come to look on this as utterly hopeless. Undoubtedly since Niebuhr's day some advance has been made in our knowledge of the Etruscan language. In 1828 appeared the first edition of Ottfried Müller's "Die Etrusker," and in the second volume of this very learned work the author established the value and power of both the Etruscan and the Umbrian letters. Five years after, in 1833, appeared Lepsius' work, "De Tabulis Eugubinis," in which he substantiated the results arrived at by Müller. The subsequent researches of Aufrecht and Kirchhoff, of Grotefend and Lassen, of Mommsen and Deecke, of Corssen and Pauli, of Curtius and Bugge, with those of English, French, Italian, and Swedish scholars, have all tended to support the results arrived at by Müller and Lepsius, till in the last edition of Müller's work, edited by Deecke, we have a very valuable supplement, in which there is very clearly and satisfactorily represented, not only the value of the Etruscan letters, but the changes of which they are susceptible, their possible combinations, the laws of syncope, of inlaut and auslaut, of anlaut and ablaut, in fact a thorough treatise on the subject.

Prof. Campbell ignores the results arrived at by these scholars, whose names are a sufficient guarantee of the conscientiousness of their labours, of their industry and judgment, their extensive learning, and their sincere love of the truth. Lepsius was perhaps better versed than any other in Egyptian writing, and his researches are marked by striking calmness and judgment. Grotefend and Lassen devoted themselves with equal success to the study of the cuneiform inscriptions. Kirchoff and Aufrecht have thrown a flood of light on the old Italian dialects. Mommsen is our greatest authority on Roman history and Roman epigraphy. Why has Prof. Campbell ignored the works of all these eminent scholars? He once quotes from Deecke, but it is from that rather meagre article which Deecke contributed to the Encyclopedia Brittannica—an article scarcely in keeping with Deecke's erudition. These earnest students were obliged to confess their inability to translate the Etruscan inscriptions, or to establish the affinity of the Etruscan language. But where these men, who spent their lives in such studies, failed, Prof. Campbell claims a complete victory. He enters the field, and waves his magic wand, and all is done; the old Etruscan starts again into life, and gives up its long impenetrable secrets. "Etruria capta est," and he declares: "I have the honour to report to this Institute, as one of the most important results of my studies in Hittite Palæography, the solution of the Etruscan problem." Perhaps we are unfitted for criticising this last wonderful achievement, as we had attached no importance to the results which Prof. Campbell imagined he had reached in regard to other languages, but we were long at a loss to understand, even from his own point of view, what possible connection there could be between Hittite Palæography and this Etruscan problem. But this present contribution is only a part of a great "Etruria Capta." He promises a fuller work in which he will offer a translation of the Eugubine Tables. We quote his words: "Of these Tables, seven only and a part of the eighth are in the Etruscan character, the rest are written in the Roman alphabet, and are in Umbrian. These Umbrian Tables are being translated and will be shortly presented to the world as the oldest Celtic documents." Umbrian Celtic? As well tell us that English is Japanese or Choctaw.

But in this promised translation of the Eugubine Tables, will Prof. Campbell kindly begin with the eighth. We have to inform him that there are not more than seven of these Eugubine Tables, and they are all in Umbrian, though five are in the Etruscan characters, and two in the Latin. The Etruscan Tables are much older than the Latin, and they prove the early extended influence of the Etruscans, and the prevalence of their alphabet. But when in 307 the Umbrians became subject to the Romans, they adopted the Roman customs and the Roman alphabet, and so the acts and the ritual of the College of Priests, which had been previously in the Etruscan alphabet, were transliterated into Latin.

Prof. Campbell has imagined that Etruscan may be Basque, and he resolves to prove it Basque. He is not the first who has imagined this. Some fifty years ago, Sir Wm. Bethran wrote some articles in "Les Annales de Philosophie Chrétienne," having for their object to prove the identity of the Basque and Etruscan. Scholars did not even condescend to review his absurd hypothesis. The only notice we believe the work ever received was in this form, "Cette assertion gratuite ne mérite pas de réfutation." Mr. Ellis, in one of his posthumous works, proposes the same.

Prof. Campbell, however, approaches the subject from a different point of view—from the supposed syllabic character of the Etruscan. But he never attempts to prove this syllabic character, he merely supposes it to be syllabic, and proceeds to prove its affinity with the Basque. Now there is a very great number of Etruscan inscriptions found, from Capua in the South up in to the Alps in the North. They are for the most part monumental inscriptions, and are therefore short. Many of them are bilingual—Latin and Etruscan, and it is reasonable to suppose, judging from other bilinguals, that the one will be a literal translation or reproduction of the other. Unfortunately these monumental inscriptions consist largely of proper names, and can aid us little in gaining a knowledge of the language; but there is this advantage which proper names present, and that is, that they will enable us to determine the character and value of the letters, and some of the grammatical forms, and it is just this advantage which has enabled Lepsius and Deecke to determine so exactly the value and power of the letters and to study the laws, which apparently govern their relations, without however gaining any fuller knowledge of the language But besides these bilingual inscriptions there are in the writings of Greek and Roman authors some forty or fifty Etruscan words, transliterated into Latin characters. So far as these words go, they are important, and yet they do not throw much light on the construction of the language, and they form a very meagre vocabulary; but this one thing they do, they confirm the bilingual inscriptions in establishing the character of the letters. As this is the point which Prof. Campbell pooh-poohs, it will be necessary to consider it for a little, and we shall take one or two examples of bilingual inscriptions:

V · LECNE V · PAPIRINAL
VEL · LICINIUS VEL · PAPIRI NATUS.

Now are we wrong in supposing that V of the first line corresponds with V of the second line, and the L of the first with the L of the second, and the whole of the word Papiri of the first with the word Papiri of the second? But before *n* in Etruscan the preceding vowel is always syncopated—the Latin Capena is the Etruscan Capna, the Latin Marcanius the Etruscan Marcna, and so Menelaus = Menle, Herakles = Herkle, and here the Latin Licinius is the Etruscan Lecne; the *i* and *e* being often interchanged. The suffix AL is a masculine genitive termination, and is of constant occurrence in the monumental inscriptions, as Arnthal of Arnth, Larthal of Larth, or son of Larth; just as in Latin we say Marcus Tullii, Marcus the son of Tullius, and the Papirinal of the above inscription is rende ed in Latin Papiri natus, and the whole inscription reads, Velleius Licinius, the son of Velleius Papirus. While *al* is the masculine suffix, the corresponding feminine suffix is -alisa, and we have this inscription. where both the father's and mother's names are given:

LARIS FRAUCNE VELUSA LATINIALISA.
LARIS FRAUCNE the son of VELUSE and LATINIA.

Similar inscriptions are very common, and a number may be found in Prof. Campbell's Etruria Capta. But the Eugubine Tables, being principally in the form of rituals, present several formulæ which occur in the Tables of the Etruscan, and also of the Latin or Umbrian character. Compare the following formulæ as they occur in the Etruscan characters of the first Table, and in the Latin characters of the sixth Table:

ETR.—Vukukum : iuviu : pune : uvef : furfath : tref : vitluf : turuf : marte : hurce :

Lat.—Vocucum · ioviu · ponne · ovi · furfant · vitlu · toru · trif · fetu · marte · horse ·
fetu : pupluper : tutas : iiuvinas : tutaper : ikuvina : vatuva : ferine : fetu :
fetu · popluper · totar · iiovinar · totaper · iiovina · vatua · ferine · fetu ·
puni : fetu : arvia :
puni · fetu · arvia ·

And again a little below in the same Tables:

Etr.—Vukukum : kureties : tref : vitlup : turup : hunte : feitu : pupluper : tutas :
Lat.—Vocucom · coredier · vitlu · toru · trif · fetu · honde · fetu · popluper · totar ·
iiuvinas : tutaper : iiuvina : vatuva : ferine : fetu : arvia :
iiovinar · totaper · iiovinar · vatve · ferine · fetu · arvio ·

It would seem impossible to doubt that in these instances we have a simple transliteration, and that the formulæ written in the Etruscan characters are literally reproduced in the Latin characters; and if so, then they establish the value of the Etruscan letters. This would seem almost self-evident, and no one has for one moment doubted it, till Prof. Campbell propounds his hypotheses. Believing that he has solved all other linguistic problems, of the Horites and Hittites, of the Japanese and Aztecs, of the Cypriotes and Choctaws, he believes it his duty also to untie the Etruscan knot. He ridicules all these bilingual similarities, and marks out a certainly original mode of dealing with the subject. He has resolved that Etruscan is Basque, and Basque he intends to prove it, and all difficulties must give way before this hypothesis. But in choosing the Basques with which he is to prove the affinity of the Etruscans, we think Prof. Campbell has been very unfortunate. The Basques are a small body of people living on the Spanish and French slopes of the Pyrenees. They number about 700,000, and are the descendants of the old Vascons. They have never played an important part in history, and have contributed nothing to the general development of civilization. They show some affinity with some of the native tribes of North Africa, but perhaps more with the inhabitants of the American continent. We know that at one time Africa was joined to Europe at the Straits of Gibraltar, and there is every probability that in the Miocene period Europe was connected with America, and the people of America may have crossed over by a great Atlantic bridge, having left however a small remnant in Spain. But, whatever the affinity of the Basques, they have, from a very early period, been largely affected by foreign influences. No part of Europe has so changed masters as Spain. Phœnicians, Celts, Greeks, Carthaginians, Romans, Visigoths, Alans, Moors, and the Romance nations have at one time or other held Spain, and have influenced the Basques, and these at the present day present physiological characteristics so diversified as to baffle all attempts at ethnological classification; and the Basque language is perhaps the most corrupt of all languages. The writer of the article on the Basques, in the Encyclopœdia Brittannica, a work Prof. Campbell is fond of consulting, says: "Foreign words are easily assimilated, but with modifications to suit the Basque ear." If Prof. Campbell was resolved on proving the affinity of the Etruscans with the Basques, he ought to have positively assured himself, that in using individual words, it was really in each case a Basque word of which he had got hold; for to prove the affinity of the Basque and Etruscan by means of Greek or Latin, Gothic or Romance words, however perfectly incorporated into the Basque, would be an absurdity; and we shall presently show that this is one of the absurdities in which Prof. Campbell has rather freely indulged.

But there is another difficulty. The Etruscan inscriptions are perhaps none of them later than the second century B.C., but the earliest examples of Basque literature are of the fifteenth century, except a short charter granted to the commune of Daviles in 1150, 3 Tomes chant des Cantabra. Now under any circumstances there must be great difficulty in proving the affinity of languages whose literatures are separated by not less than seventeen centuries, but the difficulty becomes insuperable when it is remembered that one of the languages has been subjected to very great foreign influences. We quote from M. Blabé, the greatest authority on the Basque:—"L'idiome Basque s'est tellement modifié depuis le XV ième siècle, qu'il est toujours très dificile, quand il n'est pas ab olument impossible, d'expliquer les premières textes connus qui remontent à cette époque." If the changes have been so great within three centuries, during which time the language has acquired, we should suppose, some degree of fixity through a printed literature, and when it has been comparatively free from foreign influence, what changes must have taken place in the seventeen centuries when the country was constantly changing masters, and there was no literature to fix the language. M. Blabé points out that it is impossible, just on account of the mixed character of the language and of the people, to determine the affinity of the Basques or of their language. After a lengthened review of all the sources of information, he says:—"La toponymie ancienne de l'Espagne, la numismatique dite ibérienne, le droit coûtumier, et les prétendus chants héroiques, ne jettent donc, jusqu' au présent, aucune lumière sur l'origine des Basques. Les moyens d'information sont limités à l'histoire positive, à l'anthropologie, et à la philogogie comparée. Ces trois sciences constatent unanimement que les Basques sont un peuple fort mélangé." M. Blabé plainly points out the great difficulty in determining the affinity of the Basques themselves. The undecided relations of the Basques and of their language has hitherto deterred Etruscologists, and would naturally deter any ordinary scholar; but Prof. Campbell's ingenuity can adapt itself to the most adverse circumstances, r perhaps we should be more correct in saying that he is quite unconscious of these difficulties. But he has not only determined that Etruscan is Basque, but also that it is syllabic, and therefore he has found it necessary to reject all the bilinguals. "The bilingual inscriptions," he says, " present many difficulties. In some cases I doubt their being bilinguals at all, as the Etruscans used characters hardly differing from the Latin." Prof. Campbell is evidently ignorant of the relation between the Etruscan and Latin alphabets. We shall presently tell him something about this relation, but in the meantime does he not see that the existence of even only one bilingual inscription is sufficient to give us the characters of the letters! How many Rosetta stones, or how many Behistun inscriptions, would Prof. Campbell wish? The very scant inscription on the boss of Tarkondemos, consisting of only seven words, in the bilingual of Hittite and Persian cuneiform, has afforded Prof. Sayce a key by which he has been able not only to determine the value of the letters, but even to read some of the Hittite inscriptions. Prof. Campbell, if consistent, must reject all the bilingual inscriptions. But these Etruscan bilinguals present many difficulties to Prof. Campbell, simply because they will not fall in with his hypothesis. He believes that Basque is Turanian, and as he has determined that Etruscan is Basque, it must therefore be Turanian also. But he imagines also that the Turanian languages are syllabic, and he concludes that as Etruscan is Turanian, it must also be syllabic, and now we begin to catch some idea of his meaning when he says:—"I have the honour to report to this Institute, as one of the most important results of my studies in Hittite Palæography, the solution of the Etruscan problem." The Hittite is Turanian and syllabic; the Etruscan he has determined is also Turanian, and therefore syllabic. There can then be no doubt as to the light which his studies in Hittite Palæography throw on the Etruscan problem. Let us satisfy ourselves of Prof. Campbell's reasoning: Etruscan is Basque, Basque is Turanian, Turanian languages are syllabic, therefore Etruscan is syllabic also. We are not responsible for Prof. Campbell's logic, we have only tried to reduce it to the simplest terms; but to himself nothing can be clearer, and all that is necessary is to illustrate it by examples, and applying this key, he imagines that he can unlock all the treasures of the Etruscan language. All those bilingual inscriptions are of no value, nay they are deceptive, no doubt intentionally so, possibly to perplex such men as Müller and Lepsius, Mommsen and Deecke. If we are not to accept these bilingual inscriptions as virtually duplicates, then we cannot divine their meaning. In every other case bilingual inscriptions have been of the utmost value, have been indispensable, and we cannot understand why they should be worthless here. Prof. Campbell has however decided that they are worthless, and that the door will only open to his key. Now the whole value of Prof. Campbell's researches rests on the syllabic character of the Etruscan language; but we beg to differ from him, and we maintain that Etruscan is not syllabic. But admitting with Prof. Campbell that these bilinguals are worthless, yet apart from these, apart also from the fact that we know the history of the Etruscan alphabet better perhaps than we know the history of any other alphabet, we maintain that every circumstance is against the possibility of the Etruscan being syllabic. Prof. Campbell seems ignorant of the life and growth of languages, or at least of linguistic symbols. Languages pass through separate and distinct stages in regard to the character and value of the signs or symbols of thought. The first of these stages is the Ideographic, or, as it is generally called, the Hieroglyphic. A man in his barbarous state wishes to express his idea of a horse, and he draws the picture of a horse; of a man, and he draws the picture of a man. This is the earliest form in which man has expressed his ideas, whether for the purpose of communicating those ideas to others, or of preserving them, and assisting his own memory. This figurative writing is presented in the inscriptions of Egypt and of Mexico.

But this is an exceedingly cumbersome mode of expressing ideas. An almost unlimited number of separate signs would be required. This would be most burdensome to the memory, and be unable to express grammatical relations. With the growth of ideas one sign came to express several ideas by means of determinates, or small distinguishing marks added to the sign itself somewhat similar to the vowel signs in Hebrew; but there was a tendency in these original types of figurative writing to become conventional, as in the case of Chinese and the language of the cuneiform inscriptions. Here the signs do not at once suggest what they are intended to represent. They have undoubtedly grown out of iconographic prototypes, but they have lost their resemblance. They are called semeiographs, or better ideograms. Now these ideograms mark a progress from purely figurative writing to phonetics. Thought and feeling naturally express themselves in voice, and a phonetic value came to be attached to the ideogram, and the sign suggested at once an object and a phonetic value. But the representative value of these signs became less and less prominent, and in time they were used only to express a sound or combinations of sounds. The name of the object represented a certain sound, at first no doubt the whole name, and then only a part of the name. And in this way arose syllabic writing, which was generally acrological, that is, the initial letter or letters came to express the sound which was itself expressive of an idea. In the case of the Chinese the ideogram has continued to express only one sound, and not a combination of sounds, and so the language has remained monosyllabic. The sacred books of the Chinese were however accepted by the Japanese, who adopted the characters in which the sacred books were written, but they ascribed to these characters a different phonetic value, while they combined them according to the exigencies of their own national idiom, and to permit of certain flexions. But this change, as exemplified in the Japanese or similar instances, marks a change from the ideogrammatic to the syllabic form. But the combination of signs permitted by the syllable allowed a great diminution in the number of the signs. In place of the innumerable signs of the Chinese, the Japanese expressed their vocalization by forty-seven characters wholly borrowed from the Chinese, but having different determinate values. This change of the value of the Chinese characters to the Japanese took place probably in the third century, but some five hundred years after the connection of Japan with India led to the formation of a new syllabary, based on the other, but presenting a more cursive form, and reducing the number of syllabic signs. This syllabic state of a language marks a distinct stage in the growth of language, or rather of linguistic symbols. But there is still another stage in which individual signs are used to represent individual sounds, as they are uttered by the organs of speech; and now there is possible a classification of sounds, and consequently of letters into vowels and consonants, or into dentals, labials, gutturals, and nasals, and an alphabet is formed. Now this throughout is a gradual development. The figurative writing of the Egyptians was developed into the alphabet of the Phœnicians. The conventional figurative writing of the Chinese was developed into the syllabic of the Japanese, and from that into the alphabet of the Coreans. The writing of the Accadians was developed into the cuneiform character of the Assyrians and the Babylonians, and from this passed, on the one hand into the syllabic cuneiform of the Persians, and of the Cypriots on the other. What we wish especially to point out is, that these changes mark distinct stages in linguistic development, and consequently in the development of civilization, for the two are inseparably connected. But Prof. Campbell imagines that the syllabic form is peculiar to the Turanian languages. That we may not misrepresent him we shall quote his own words. He says:—"The problem therefore is to find the powers of the Turanian alphabet or *syllabary*, Besides the Cypriote, the Corean of far Eastern Asia has furnished me with phonetic values of forms belonging to the Etruscan and other old *Turanian syllabaries.*" Again:—"As the syllabic values of the Aztec characters are well known, I gained in them the actual key to the old Turanian *syllabaries.*" With only a passing allusion to the absurdity of connecting the Aztec characters with the Cypriote, we wish to lay especial stress on Prof. Campbell's association of syllabism with the Turanian languages. On the other hand we would express our entire divergence from him, and we maintain that syllabism is a stage of linguistic development common to the Semitic and the Aryan with the Turanian languages. Take Persian as a type of the Aryan; Egyptian, or Assyrian, or Babylonian of the Semitic, as well as Japanese of the Turanian. It is quite true that very many of the Turanian languages at the present day are syllabic. The Japanese have only now reached that stage of development in which they find the syllabary inadequate to their growing requirements, and are adopting the alphabet of the European nations. But we repeat that syllabism is not peculiar to any one class of languages; it marks a stage in linguistic development. However, Prof. Campbell has determined that Etruscan is Turanian, and therefore syllabic. This is the result of his researches in Hittite Palæography, and cannot be doubted, and he sets about forming an Etruscan syllabary. But here a new difficulty meets him in the small number of the Etruscan signs. Simple letters may enter into an almost unlimited number of combinations, but syllables are not so flexible, will not so easily combine, and we require a very much larger number of syllabic signs. Thus the Amharic has thirty-three consonantal signs, each of which may combine with seven vowel signs, and a separate sign is used to denote each of these combinations, so that in the full Amharic syllabarium there are two hundred and thirty-one different signs. The Persian, though approaching very closely the alphabetic form, has thirty-six distinct characters. But Etruscan has only twenty signs. Here too Prof. Campbell's ingenuity does not fail him, and he makes his syllabic signs mean anything, thus:—

I = ha he hi ho hu au ou eu oi o u hau.
π = ta te ti da de di at et it ad ed id.
K = os ots oz otz u o uts ots uz utz hotz hetz hy hots hits.

L = so sa za zo zu us oz, sometimes es ez, also it may denote cho chu cha, and ja jo ju.

In other words, the Etruscan syllabic signs represent in each case nearly all the vowel sounds in combination with a large number of consonants, so that we may make anything we please of these syllabic signs. Prof. Campbell acknowledges this, for he says:—"The poverty of the Etruscan syllabary multiplies the equivocal to such an extent that the context, or even a knowledge of the nature of the document in which the words occur, must decide their value."

The signs of this syllabary may mean anything we may choose to make them mean, only we must know beforehand what we expect them to say before we can make them say it. This is certainly very accommodating, but has it not struck Prof. Campbell that it is an insuperable difficulty in the way of receiving his hypothesis? But his syllabary of such a low order is inconsistent, not only with the evident laws of linguistic growth, but with the known facts of

Etruscan civilization. The Etruscans had reached a high degree of civilization. At an early period, long before the date of the earliest of these inscriptions, the Etruscans were in close relations, commercial and otherwise, with two of the most civilized nations of the ancient world, the Greeks and the Carthaginians, and among whom the Alphabet had reached the fullest development. It is inconceivable,—it is wholly inconsistent with what we know of linguistic development, that the Etruscans should, alone of these nations, have remained in the syllabic stage, that while in every other respect they should have been noted for their civilization,—a civilization to which every museum in Europe bears evidence, that yet in their language they should have belonged to a past epoch. In a work of William Humboldt, "Über die Verschiedenheit des Menschlichen Sprachbaues, und ihren Einfluss auf die geistige Entwickelung des Menschengeschlechtes," there are such expressions as this: "There is a mutual action of language on the mind and intelligence of a people, and of the mind and intelligence on the language. This is a capital fact. The mind of a nation, and the character of its language are so intimately bound up together, that, if the one is given, the other may be exactly deduced from it." We hold it impo sible that a nation which was in a degree of equality with the Greeks,—a nation from which the Romans borrowed some of the most prominent features of their civilization, should have made no advance in their language beyond the syllabic state. But suppose we admit Prof. Campbell's assertion, let us see what he makes of it. We have already stated that there are some forty or fifty words occurring in Greek and Latin authors, and written in Greek and Latin characters. These words, however, he treats as literal or alphabetic; but it happens that some of these words oocur in the inscriptions, and here he treats them as syllabic. But so elastic in his mode of procedure that both alike are made to serve his purpose. He says: "Of the Etruscan words furnished by classical authors, many at once reveal their Basque origin. Lar or Lars, as Lars Porsena is the Basque *larri*—Great." This titular prenomen appears to have been one of the most common among the Etruscans, as: Lars Porsena, Lars Tolumnius, Lars Herminius Now when it is found in Greek or Latin writers it is allowed to retain its literal form, but when it occurs in the incriptions it is syllabic, and is read Saratuka, and means "engraved." It occurs in an abbreviated form at page 34 of "Etruria Capta," and again at page 29, in the feminine. But is difficult to imagine how the same word can be at one time alphabetic and at another syllabic. This Lars as it occurs as a titular prenomen means *great*, no doubt in the sense of famous; just as we say Charles the Great, or Peter the Great, or Frederick the Great. Unfortunately we can find no such meaning given to *larri* in our Basque Dictionary. Here it is defined as "un peu gros,"—somewhat gross, or rather perhaps fat. Not as if it were Charles the Great but Charles the Fat, Charles le Gros,—whom the Germans called "Karl der Dicke." It is great in the Falstaffian sense. We doubt whether Prof. Campbell will be willing to accept this rendering. But in our Dictionary *larri* stands in a very suspicious connection, and has a very Romance look. It occurs as follows:—Largo, élargir; Laranzo, largesse; Largo, large; Larri, un peu gros. It is evidently a Romance word accepted by the Basque, and therefore cannot be used in tracing the affinity of the Etruscan with the Basque. Let us take another example of Prof. Campbell's translations:

Etr.—F. LEONE, F. OAΛIPNAL.
Lat.—C. Licinii. C. F. Nigri.
Translit.—*Age* Sanesikane *aje* morabautukarasa.
Basque, —Age Zunt-gikin age Maira Baitu sortze.

We shall not occupy time with minor criticisms, but "*age*" does not mean "to behold"; the proper word for behold is "icust." But Prof. Campbell says, "The Latin Licinii is a derivative from licium, a leash, a tag, a thread. It corresponds exactly with the Basque *zunft*, a needleful. The final *kane* represents *egin*, to do; Zuntzegin may be an old name for tailor or weaver. The other proper name translated Nigri is Maira, a Moor or person of dark complexion. The Etruscan adds Baitu, the spotted, from *bai*, a spot, as the mother of Maira. In Latin her name would probably be read as Varia." This is a very partial instance of the playfulness of Prof. Campbell's fancy. What possible connection can there be between Licium and Licinii? Licinius was one of the most common of the Roman Gentile cognomens. It especially occurs in the Gens of the Fabii, who had other connections with Etruria than the disaster at Veii. But the Licinian Gens, though of plebeian origin, was very influential. It is generally regarded as having come from Etruria, and when C. Licinius Calvus was consul in 364, mindful of his Etruscan origin, he secured the admission of Etruscan youths to the Roman games. The name occurs very often in Etruria, but also in Latium; at Tusculum we have the Porcii Licinii, and at Lanuvium the Murenae Licinii. The form Lecne, and also the feminine Lecnesa, are very often met with on the Etruscan monuments. Licinius is simply the latinizing of Lecne, and has nothing whatever to do with *licium*, and still less with the Basque Zunft. But in this inscription occurs the word, or rather terminal, *nal*. No form occurs so frequently in these inscriptions as this. In the bilinguala it is invariably rendered by the Latin *natus* or *filius*. Now, the uniformity of this rendering evidently occasioned some difficulty to Prof. Campbell, and his object is to work in some word which will preserve this signification; according to his syllabarum, "*nal*" reads "karasa," and he says this represents the Basque "sortze". Now, as Prof. Campbell evidently attributes much importance to these words, and seems to regard "karasa" and "sortze" as test words, going far to show the connection between Etruscan and Basque, and as his reasoning here presents a very good example of his reasoning in general, at the risk of being a little tedious, we shall examine it, and shall give his own words. He says, "The Rev. Isaac Taylor and other Etruscologists, while failing to translate these inscriptions, have made some good guesses. Such are their suppositions that the characters they have read *isa* denote a wife, those read *sec* a daughter, those read *al* a child. The first is read *nare* or *anre*, a wife; the second, *nechi* or *nesca*; and the third, *karasa*; in modern Basque, *sortze*, *natus*." Surely Prof. Campbell must be aware that modern Basque can have no bearing on the present question; he might as well try to prove the affinity of the Japanese with the old Gauls by means of the present French. However, he proceeds at some length to justify the relation of these two words *karasa* and *sortze*. He says, "It has been objected that *karasa* and *sortze* are difficult to reconcile; that *nal karasa* means natus, several bilinguals attest." Prof. Campbell's consistency is very wonderful. "The Basque 'natus' is *sortze*. The only difficulty in the words is the replacement of *ka* by *so*, after an interval of over one thousand years in the history of the language." We must plead inability to understand Prof. Campbell, but so far as we can make out, he means that one thousand years ago the *so* of *sortze* was *ka*; and that within the last thousand years it has undergone a change, and *kartze* has become *sortze*. What proof can Prof. Campbell adduce of this? How does he know that a thousand years ago *sortze* was *kartze*, when he has no document with which to compare it older than four hundred years ago? He refers to Van Eys's "Tableau des permutations des consonnes dans les mots Basques des différents dialectes." We fail to see what this reference has to do with the question. Van Eye is alluding to the large number of the Basque dialects, and he tabulates these dialects as they at present exist, but this has nothing to do with the historical changes which have taken place in the language, or with its analogies with other languages any more than a comparison of the dialect of Yorkshire with that of Lancashire, or with the London cockney has to do with the old Celtic of the earlier Britons. But Prof. Campbell regards the words *karasa* and *sortze* as so important that he illustrates their relation to one another by their supposed common affinity to the Japanese. He says the Japanese equivalent of the Basque *sortze* is *harama*. This is very learned, and we feel our inability to follow Prof. Campbell; fortunately, it is not necessary. We suppose he will not require to be told that the nearest neighbours of the Basques on the north are the Provençal, a people speaking a Romance dialect. But if Prof. Campbell will turn to a Romance Dictionary he will find this word *sortze* not even changed, as the writer in the Encyclopædia says, "to suit the Basque ear"; or, better still, if he will turn to Diez's Dictionary of the Romance languages, he will find there *sortze* with all its Romance affinities; it is a derivative from the Latin *surgere*. This word is not Basque; it is a Romance word so lately introduced into the Basque, that it is as yet unchanged, and the very learned disquisition about its being *kartze* a thousand years ago, and about its affinity with the Japanese *harama* is all thrown away upon us, and we still doubt the Etruscan being syllabic or that it has any connection with the Basque.

But further, on page 27 of "Etruria Capta" occur these words *Rakora* translated "offering," and in each of the next three inscriptions occurs the word *Rako;* so that on the same page *Rakora* occurs once, and *Rako* three times, and on all these occasions it is a noun and means an offering. These words occur very frequently in "Etruria Capta." So also do *Ra* and *Rano*, and at page 69 occurs *Rapi*, a verb, "to receive," and at page 98 we read "*Rako atso Rakone*," translated "towards age acknowledging,"—and regarding *Rakone* Prof. Campbell says: "The final ne seems to change the postposition *rako* into a verb,"—rather a unique grammatical change, we think unparalleled in the history of language, and surely he forgets that he has all along translated *Rako* as a noun and not as a post-position. He continues: "Here *Rakone* seems to signify "acknowledging," "paying respect to." We very much wonder, that with Prof. Campbell's profound knowledge of Basque, he has not discovered that in Basque no word begins with R. When we began to read "Etruria Capta" we were rather surprised at frequently meeting with words beginning with R, and to find even allusions to them in the notes without any apparent consciousness of their irregularity; we turned over page after page of Basque to find a word beginning with R, but without success. We again consulted our Dictionary, and under the heading R we found the following: "Cette lettre R n'est en usage, au commencement des mots Basques, que pour les noms propres tels que Rome, Rambouillet, et encore dans' le langage familier, les Basques diront Erroma, et non Roma. Il est à croire que le suppression de la consonne R comme initiale des mots a pour cause certaines difficultés que son articulation semble offrir d' abord." Humboldt says: "No word in Basque commences with R. The Basques always place an *e* before foreign words of this category, and then double the R. And in certain cases, as in the words *edastea* and *erastea*, there is a dialectic change of *d* and *r*. But they always say *erregue*—roi" M. Blabé, the most competent authority, says: "Je conviens que le Basque n' a point en propre de mots commençants par *r* et que lorsqu' il donne l'hospitalité dans son glossaire a des mots ou *r* est en tête, il a soin de les faire précéder d'une voyelle. Sur le versant Nord des Pyrénées occidentales cette voyelle est un *a*—*arraya* la race," *arrichina* resine. De l' autre côté des Pyrénées les Basques disent aussi *arrocher*—rocher. Cependant ils préfixent plus volontiers l' *e*—*errisina*, resine, *errabia*, rage. Peutêtre en bien cherchant trouvera-t-on quelques mots où ces préfixes *a* et *e* seraient remplacés par *i*. Aussi selon les pays, viz.: se dit *arrosa* ou *irrisa*." We do not see how we can reconcile Prof. Campbell's constant use of the *R* with the plain testimony of these eminent Basque scholars.

From the first page to the last of "Etruria Capta." any affinity between languages is based on mere similarity of sound. Prof. Campbell never once points to any similarity in grammatical forms; yet it is on this alone that any such affinity can be proved. Nay, he even makes a virtue of his rejection of grammatical forms, and he says: "I have set forth the fact that, various as are the grammatical forms of Basque, Caucasian, Yeniseian, Japanese, Corean, Iroquois, Chocktaw, and Aztec, they are one in vocabulary, and constitute with many other members a linguistic family of no small importance. The parent speech belongs to Syria. West of Syria, in Asia Minor, Italy, Spain, and Britain, the inscriptions yield Basque." We think we have shown how far Prof. Campbell is competent to speak of this. He continues: "East of Syria, in India, Siberia and on this continent, the Japanese at first, and afterwards the Aztec, are the languages set forth." And again: "The threefold Tyrseni, Tuscer, Naharcer, Japuscer, carry us back to Mesopotamia, the land of Nairi or Nahirina, and to the region of Khupuscai, as well as forward to Navarre and Guipuscoa. The former even takes us to this continent, where the Aztecs or Citin also called themselves Nahuatl or Navetl. Who the Tuscer were it is harder to say, for the final *er* is a termination; otherwise the great Basque name *Euskara* would at once suggest itself in such a form as the Dioscurias of Colchis, now Iskurieh, near which Chapsoukes or modern Khupuscians and eastern Guipuscoans dwelt." It is hard to characterize this. It is simply philology run mad. Euskara and Dioscurias connected! Prof. Campbell knows Greek, and should know that the cities which bore the name of Dioscurias, and of which there were several, received that name because they honoured as their tutelar Deities, the twin sons of Leda, Castor and Pollux, the Dioskouroi.

Perhaps the leading error into which Prof. Campbell falls is the constant application of the laws which govern the Aryan languages to the Turanian also. Grimm's laws, of the variations of consonants in the Aryan languages, do not hold good in the Turanian. But even in Aryan languages, it is always dangerous to conclude that words which assimilate in sound, or that have the same class of consonants, are connected, and much less may such assimilation be trusted in the Turanian languages. Rask, Schott, Cap'trén, Rémusat, and Boetlingk,—in fact all who have written on the Turanian languages, are very particular in guarding us against depending on the similarity in sound. But they also tell us that it is absurd to expect the existence of the same words running through the Turanian languages as they do in the Aryan. The Turanian languages have not been thoroughly classified, and the difficulty lies not only in the variation of grammatical forms, but quite as much in the vocabulary. Speaking generally, the Turanian nations have had no literature to fix words, and the consequence is that they differ from one another to a degree of which the Aryan scholar has no idea, and which makes it impossible to compare them in the very loose way Prof. Campbell has attempted. The basis of the classification of the Turanian languages has hitherto been according to the employment of pronominal affixes, but this is an unsatisfactory and very meagre mode of arriving at a classification. Max Müller says: "To maintain a word and not to allow it to be replaced by a new expression was possible in the Aryan, that is in a social state of the language, not among nomad tribes, who, living only for the present, were little concerned about the past or future, without history, without ambition; and thus we find that the number of common words is very small." Schott says: "We ought not to despair about the affinity of these languages, the Turanian, although the words for the most necessary ideas in them are so essentially different. To Prof. Campbell, however, the Turanian languages present no difficulty whatever, and he proves their affinity with one another by long lists of words, which he says are identical in Basque and Etruscan, in Japanese and Circassian, in Hittite and Chocktaw, in Iroquois and Aztec. We trust Prof. Campbell will pardon us if we prefer the judgment of Müller and Schott, and of a score of other Turanian scholars to his judgment, and if we express a very strong doubt as to the value of his researches and his very remarkable conclusions.

And now a few words regarding the Etruscan alphabet, its origin, some of its peculiarities, and the extent of country over which it prevailed, and a short statement of what is generally received concerning the origin of the Etruscans. The town of Chalcis in Eubœa was one of the oldest of the Phoenician colonies, and received from Phoenicia the alphabet, which it adopted with very little change. When Chalcis became an Ionic possession it still retained its alphabet, which is more closely connected with the old Phoenician than any other of the Greek alphabets. Shortly after Chalcis became Ionic it entered into rivalry with Miletus for commercial and colonial supremacy. Miletus acquired a supremacy in Eastern Europe, in the Ægean, and the Euxine; while Chalcis turned to Italy and the West. Cumae was founded by a colony from Chalcis, and became a centre from which Greek learning, Greek culture, and the Greek Chalcidian alphabet were communicated to the rest of Italy. Etruria early received its alphabet from this source and an examination of the Etruscan letters will at once show their similarity with that earliest Greek alphabet. The Etruscan, the Umbrian and the Oscan of the Italian dialects approach most nearly in their alphabets to the Chalcidian, and the Latin is the farthest removed. The Etruscan rejects the soft mutes B, G, D, and retains the aspirates *th, ph, ch.* The Latin on the other hand retains the soft mutes and rejects the aspirates. The Etruscan and the Umbrian alike retain the Sam and the Sigma, the Zain and Samekh of the Phoenicians. At that early period we perhaps cannot expect exact fixity in the alphabet, and while all the Etruscan inscriptions are of the same type, there are yet some minor differences, as we may see by comparing the pure Etruscan alphabet with the Etruscan alphabet of Campania. This last lying close to the Oscan, seems to have been affected by it. The influence of the Etruscans was very great in the South, but especially so in the north of Italy, and even in the districts still further north. They carried on commerce with central Europe, and apparently with the countries around the Baltic. Northern wares are frequently found in the tombs, and were also exported from Tarquinii, a seaport which rivalled Massilia in the amount of its exports. The result was that the Etruscan alphabet extended far into Europe, and from the *Romana Provincia* on the west to the Tyrol and Carinthia on the east. Throughout this extended district the Etruscan alphabet prevailed. But in the northeastern corner of Italy another element was introduced and another Greek alphabet. That movement which drove the Dorians out of Thessaly to the south seems to have compelled the migration of another tribe into north Italy, and this tribe settled about the mouths of the Po and the Adige. Whether these were Veneti or the Euganei, we are not prepared to say. The inscriptions in this alphabet are found principally at Este. With which of the Greek alphabets we are to connect it is still uncertain. Berndorf believes it to be Ionic; Kirchhoff regards it as Locrian; while the Bronze of Tegea would seem to connect it with the Arcadian or the Elean.

And now, before we close, a few words regarding the origin of the Etruscans. Herodotus tells us that the Lydian nation having, from internal difficulties, become divided, one portion emigrated from Lydia under Tyrrhenus, or, as he is some times called, Tarchon, and that after a time these emigrants settled in Umbria, and by Umbria Herodotus means North Italy. Whatever importance we may attach to this story it must be admitted that there are some facts which seem to lend it plausibility. The sea which washes the west coast of Etruria has, from an early period, been called the Tyrrhenian Sea, and the city of Tarquinii is regarded as having derived its name from Tarchon. That a band of pirates called Tyrrhenians did long infest the Ægean Sea is well attested, and it seems equally certain that a portion of them settled in Italy. Thucydides speaks of Tyrrhenian-Pelasgians who had originally dwelt in the peninsula of Athos, but were driven from there to Athens or Attica, and finally took refuge in Lemnos. Herodotus adds that these Tyrrhenians drove out the Minyae and held the island for some time but were overpowered by Otanes, a general of Darius Hystaspes. After the close of the Persian wars, the Athenians took possession of the island. Both ancient and modern writers identify these Tyrrhenians with the Tyrrhenian invaders of Italy. Niebuhr was the first to point out that the Etruscan was a mixed language, and Lapsius believes that with a strong Pelasgic element there is combined an Umbrian and possibly a Greek. Without entering into any discussion of these opinions we notice that the identification of the Tyrrhenians of Lemnos with the Tyrrhenians or Etruscans of Italy has been confirmed by the recent discovery on the island of Lemnos of two inscriptions in unmistakable Etruscan. These inscriptions, which seem of different dates, are engraved on two sides of a large block of stone, which evidently formed part of an altar. As read, the altar is called the Altar of the Hephaestii, and is dedicated to Zerona, worshipped in Myrina. Hephæstias and Myrina were the two principal towns on the Island. This deity, Zerona of the Tyrrhenians of Lemnos, suggests a connection with the Zirne of the Etruscans, and the Macedonian Zeirene, and, perhaps, with the Thracian Zarunthos, -thos being a masculine termination. These similarities would seem to identify the Tyrrhenian-Pelasgians of Etruria with the Pelasgians of Greece. But there is satisfactory evidence connecting this stone with the place where it was found. It bears the names of the two towns of the island, and is dedicated to the tutelar Deity of one of these towns, and it must be remembered that the dedication is in the Etruscan language. This new discovery certainly corroborates the information given by Herodotus, by Thucydides, Hellanicus, Plutarch and Strabe. But perhaps this new discovery does not determine very much, for the question will be asked: Who were these Tyrrhenian-Pelasgians? But this discovery will have the effect of pointing out more definitely in what direction researches ought to be pushed, while it renders more probable the finding of some bilingual which may furnish the key to unlock the Etruscan mystery. It does not as yet permit any new solution of the Etruscan problem, it only gives hope of some further light on the subject.

The President said that it was hardly fair to consider that Prof. Campbell had overlooked the fact that a syllabic language was a stage of development from picture-writing. He considered that Prof. Ferguson had taken quite as much liberty with the principles of philology as Prof. Campbell. In regard, however, to inscriptions that he had shown Prof. Campbell, the latter acknowledged that if a satisfactory explanation could not be given, his whole theory must fall to the ground.

The President read a paper on " Eskimo Numerals."

EIGHTH MEETING.

Eighth Meeting, 8th January, 1887, the President in the Chair.

Exchanges since last meeting, 136.

The following were elected members :—Thomas M. Scott, G. S. C. Bethune, A. Gaunt, S. Jardine, John L. Kerr, W. E. H. Massey, R. Pitman, C. F. Wagner, Henry Winnett, H. S. Alexander, F. D. Manchee.

Mr. Arthur Görgenyi, on invitation of the President, read a paper on " The Corea."

On motion by Dr. Meredith, seconded by Mr. J. C. Dunlop, the thanks of the Institute were tendered to Mr. Görgenyi for his interesting and valuable paper.

On motion by Dr. Kennedy, seconded by Mr. Boyle, the privileges of membership of the Institute were tendered to Mr. Görgenyi during his stay in Toronto.

Dr. Rosebrugh read the following paper on "Duplex Telephony."

In this paper I desire to call the attention of the members of the Institute to some recent advances that have been made in the direction of duplexing telephone lines. It is now ten years since the telephone was introduced but it is only quite recently that attention has been directed to duplex telephony. Duplex telephony seems to be adapted to long distance telephony only. In long distance telephony the best results are obtained when two wires are used, one wire being used as a return wire;—the two wires forming what is called a metallic circuit. The wires used for this purpose require to be first-class conductors. They are now made of copper. This necessarily very much increases the cost of long distance telephone lines, firstly because copper wire is expensive and secondly because two wires instead of one are used.

Hence any means or device that will increase the working capacity of telephone-trunk-lines will proportionately decrease the cost of long distance communication by telephone.

When I took up this question a little over two years ago my object was to use the metallic circuit or double wire trunk line system connecting two telephone exchanges so that either two telephone subscribers or a telephone subscriber and a central office operator at each end of the metallic circuit could communicate simultaneously without interference. In order to accomplish this I found that there were two problems to solve, firstly, how to render the central office receiving telephones neutral to the subscribers' transmitters, and secondly, how to render the subscribers' receivers neutral or irresponsive to the central office transmitters.

The solution of the first problem was not attended with any great difficulty. The plan adopted was as follows, namely :—At each central office and at each end of the metallic circuit a subscriber's line was attached. Instead of using the ordinary telephone receiver with a single coil, a telephone with a double coil was used and instead of inserting said coil in a single branch of the metallic circuit, one coil was inserted in one branch and the other coil in the other branch of the metallic circuit and the connections were made so that electrical currents traversing one coil, would be neutralised by the electrical currents traversing the other coil. Speaking technically, the coils were connected differentially. The electrical currents generated by the subscribers' transmitters passed through the two coils in opposite directions and consequently neutralized each other. Hence while two subscribers, one at each end of the metallic circuit, were using the line, nothing would be heard in the central office telephones.

The first problem having been solved, I was encouraged to attempt the solution of the second, namely, how to render the subscribers' telephones neutral to the central office transmitters. This was found to be a difficult problem. It was obvious that if the transmitters were placed in either branch of the metallic circuit, the electrical currents generated by said transmitters would divide at the junction of the subscribers' lines and a portion of said currents would escape to ground through the subscribers' telephones. Without stopping to enumerate the different expedients resorted to, I finally saw that the only solution to the problem was to arrange the central office transmitters so that both branches of the metallic circuit would be charged equally, simultaneously, and in opposite directions. By charging one wire positively and the other negatively at the same time, I saw that the electrical equilibrium between the two wires could be disturbed without affecting the equilibrium of the subscribers' lines. Fortunately after many and various experiments the means for accomplishing this were discovered and the problem was finally solved.

I also discovered that this can be accomplished in several ways. I will call your attention to but two of these. The first of these methods is to use a transmitter with two induction coils, the primary coils being connected either in series or in multiple arc, and the

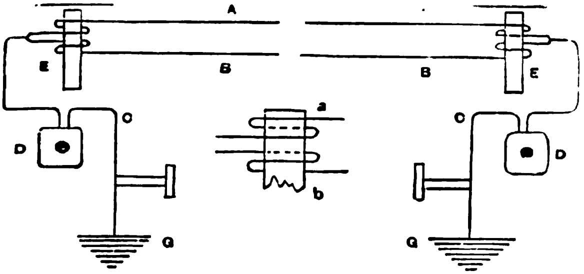

FIG. 1.

In Fig. 1 *A.A.* and *B.B.* are two branches of a metallic circuit, and *C.C'.* are two subscribers' lines attached thereto. *D.* and *D'*, subscribers' transmitters, and *E.E.* are receiving telephones at two central offices at each end of the metallic circuit respectively. The telephones *E.E.* have two coils, *a* and *b*, the former connected with wire *A.* and the latter with wire *B.* These coils are connected differentially, and the telephones are neutral to the snbscribers' transmitters.

secondary coils being connected in circuit, the one in one branch of the metallic circuit and the other in the other branch of the metallic circuit. In the second method, repeating coils are used with one coil in each branch of the metallic circuit, said coils being connected with each other and also with an independent telephone circuit.

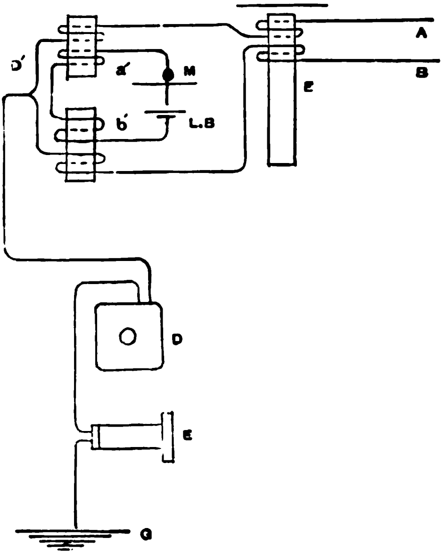

FIG. 2.

In Fig. 2 *A*. and *B*. are the two branches of a metallic circuit at one end of a telephone trunk line. *C*. is a subscriber's line, and *E*. a receiving telephone in said subscriber's line. *D'*. is a transmitter with two induction coils at the central office. The secondary coil of coil *a'* is in circuit with wire *A*, and the secondary coil of coil *b'* is in circuit with wire *B*. *M*. is a microphone, and *L.B*. the local battery connected with the primary coils of *a'* and *b'*. *E*. is the differentially wound receiving telephone at the central office.

In the first method the operation is as follows : The voice impulse vibrates the diaphragm of the transmitter, this varies the strength of the local battery circuit traversing the primary coils of the two induction coils, this generates secondary currents in the two secondary coils and this in turn generates electrical currents in the two branches of the metallic circuit, and if the two coils are properly balanced, electrical impulses are generated in each branch of the metallic circuit equally and simultaneously, and if the connections are properly made, these electrical impulses traverse the metallic circuit in opposite directions, the currents generated in one coil being reinforced by the currents generated in the other coil.* I might mention here in passing that the converse is also true, namely, if the connection of one of the coils be reversed, the currents generated by one coil will be opposed by those of the other and no current will traverse the metallic circuit, the currents will meet, however, at the subscribers' lines, and, being reinforced, will proceed to "ground" through the subscribers' telephones. Advantage may be taken of this fact and two sets of transmitters may be used at the central office or at any point in the metallic circuit, and they may be connected in such a manner that the subscribers' telephones will be responsive to one and neutral to the other.

Preferably, however, I would give the subscriber both a return wire and a ground wire, and, preferably, two installations of telephonic apparatus; one a single installation for ordinary use, and the other an installation of duplex apparatus for long-distance telephoning on the metallic circuit.

When repeating coils are used for charging the two branches of the metallic circuit, said branches are charged indirectly through said repeaters. I am aware that there is nothing new in using repeating coils in telephone circuits, but, so far as I am aware, they have never been used as here described nor with the same object in view, namely, to actuate and to be actuated by both branches of a metallic circuit simultaneously. The advantage of using repeaters, as here indicated, is to enable two subscribers at each end of the metallic circuit to communicate simultaneously without interference, one subscriber using a line connecting directly with the metallic circuit and the other subscriber using a line connecting indirectly by means of the two repeating coils. Hence by a combination of these two methods it will be seen that either two subscribers or one subscriber and a central office operator at each end of a metallic circuit may communicate simultaneously without interference.

One important advantage resulting from this arrangement remains to be named, namely, the subscribers have the advantage of two conductors instead of one. This reduces the resistance of the line one-half, and must necessarily very much improve the working of long-distance telephone lines. This idea may be extended as follows: Two metallic circuits may be connected at each end so as to form a third metallic circuit. This third metallic circuit may contain duplex central office telephonic apparatus and form a connection with a subscriber's line as well. This would give the subscriber the benefit of four conductors. The four trunk lines would be formed into three metallic circuits, and three repeating circuits could be used. In other words, the four wires would admit of four subscribers at each end of the line using the same wires simultaneously.

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* Adjustable cores are used in connection with the two induction coils for the purpose of balancing, in case the two branches of the metallic circuit are not perfectly balanced.

In August, 1885, I communicated my duplex telephone system to Prof. S. P. Thompson, of the Finsbury Technical Institute, London, England, and, through his advice and kind offices, a patent was taken out in Great Britain. An application was also filed at Washington. I submitted my system to the American Bell Telephone Company in May last, but I have not learned whether it has as yet been put in practical operation. In the meantime two claimants have made their appearance, namely, one J. J. Curry and one J. A. Barrett, the former an employee of the New England Telephone Company, and the latter an employee of the New York Telegraph and Telephone Company, both under the control of the Bell Company. One claims the arrangement of the differentially wound apparatus, and the other the arrangement of the repeating coils.

I will conclude this paper by giving two extracts from the New York *Electrical World* bearing upon the subject. The first appeared July 31st, or about two months after my system was submitted to the Bell Telephone Company. It says :—

> "The great expense attending the construction of copper lines for long-distance telephony has naturally led those engaged in solving the long-distance problems to seek means for increasing the capacity of the wires. The steps to be taken are analogous to those adopted in the case of the telegraph, where the duplex and quadruplex have greatly increased the value of the lines. It is not hard to believe the report, therefore, that the American Telephone and Telegraph Company, a description of whose lines between New York and Philadelphia we gave lately, is now undertaking experiments with the object of duplexing its wires, and thus practically doubling their capacity and utility. Several methods of duplexing telephone lines have already been proposed and have been the subject of discussion and trial among telephonists, but they have not come into use, in this country at least. The delay has been due probably to a lack of necessary incentive, such as the long-distance service now furnishes. While the difficulties to be overcome in the duplexing of telephone lines are greater than with the telegraph, it is safe to say that satisfactory results will in time be attained. We understand that the work in the present instance is in highly competent hands, and even now gives excellent promise of developments scarcely hoped for."

The second notice appeared October 23rd last, and reads as follows :—

"The telephone lines connecting New York and Philadelphia, recently erected by the American Telephone and Telegraph Company, of this city, have already been described in our columns. It was evident to all interested that lines running parallel for over one hundred miles would suffer from induction if the ordinary "grounds" were employed: hence complete metallic circuits of hard-drawn copper wire were erected, through which the articulation obtained, as we have ourselves tested, leaves nothing to be desired. It becomes manifest, however, that the erection of a double circuit is accompanied by a considerable increase in the cost of construction. Hence it is but natural for the company to seek in some way to increase the capacity of its lines, but still to retain the advantages of the metallic circuit.

"The duplexing of these telephonic circuits was, therefore, undertaken by Mr. John A. Barrett, of Brooklyn, who has succeeded in devising a system which, broadly stated, *consists in bringing the metallic or double-wire instruments at the terminal stations into inductive relation, by means of converting or repeating coils, with both sides of the circuit.*"

The question of priority of invention will be decided by the United States Patent Office, and I doubt not due justice will be done in the premises.

Mr. R. F. Stupart read a paper on "Barometric Pressures."

The President congratulated the Institute on the three valuable and important papers that had been read that evening, and contrasted the present with the time when it was difficult to procure even one paper, which was read to an audience of from six to a dozen persons.

NINTH MEETING.

Ninth Meeting, 15th January, 1887, the President in the Chair.

Exchanges since last meeting, 19.

The following were elected members :—J. J. Kelso, William George Mutton, Alfred Henry Mason, F.C.S., M.R.M.S.

Mr. F. F. Payne read the following paper on "The Mammals and Birds of Prince of Wales Sound, Hudson's Strait."

During a stay of thirteen months at Prince of Wales Sound, Hudsons Strait, with the primary object of taking meteorological observations, and having some leisure time I devoted as much of this time as was possible to the study of natural history of this region, making collections of the mammals, birds, fishes, insects, and plants; also making numerous notes from my own observations and from such information as I could gather from the Eskimo, who are most keen observers of nature.

So much has been written descriptive of the habits of the mammals and birds found in these regions, by those who accompanied the expeditions of Drs. Hayes and Kane, and by other able writers, that it would be almost useless to go over the same ground again. I shall now therefore only dwell briefly on such other items of interest as came under my personal observation and knowledge, giving the dates of migrations, etc., of each species in the order in which they stand.

MAMMALIA.

POLAR BEAR *(Ursus Maritimus, Linn), (Nannook, Eskimo).*

The Polar Bear, though numerous two hundred miles to the westward, is scarce in Prince of Wales Sound, and although a sharp lookout was kept for them only four were seen, one of which was shot.

The Eskimo informed me it was useless to look for them during the winter, as they were never seen until June, when the ice is breaking up. They are then occasionally taken on the ice-floes as they drift to the eastward with a regular current that sets this way, which is of great assistance to the bear in its migrations.

At this season, the seals, on which the bear mainly subsists are very numerous and are captured while they sleep, the bear creeping to within a short distance and then running at full speed upon them.

Though almost a marine animal, the bear occassionally visits the land where it regales itself on the young grasses, the eggs of the gull and duck, and has been seen capturing salmon and trout by driving them into a corner in shallow streams.

On the whole I do not think it is as fierce as it is generally supposed to be, for although many enquiries were made of the Eskimo as to this, they could not recall a single instance of its having attacked any of their people, nevertheless it is feared by the women who were careful not be alone at the time several were seen and all of them expressed fear of it.

WOLF *(Canis Lupus Occidentalis), (Armarho, Eskimo).*

Little can be said of this animal as none were seen during my stay here, and I was informed by the Eskimo they were now seldom taken though at one time were very numerous.

They are very troublesome to the Eskimo, often tearing their sealskin boats or kyaks in pieces and devouring the skin, which they relish very much.

Their food is very varied and their appetite so great there are few animals they will not attack and devour, even the Eskimo dog is occasionally carried off.

Their fur is very much valued by the Eskimo for clothing, but as a rule goes to the trader for powder, lead and tobacco.

WOLVERINE *(Gulo Luscus)*, *(Kubvic, Eskimo)*.

This is the Eskimo's greatest enemy, and should one appear at any time near their camps they will not rest until it has been killed, and when one is brought in there is great rejoicing. It is the most ingenious thief of all the animals in this region, and is so strong that no Caché, however well built, is safe where it exists. It will turn heavy stones over and once in the Caché it does not stop to untie the well made skin bag but soon tears a hole and, Eskimo fashion, lives on oil and blubber until the bag is emptied, when it turns its attention to the next Caché.

The thieving propensities of this animal are so like that of a dishonest human being that an Eskimo who is known to be a thief is called a "Kubvic" by his people.

Fortunately this animal is not numerous in the Sound, though they are often trapped a few miles to the westward where they, like the wolf, are seen throughout the year.

ARCTIC FOX *(Vulpes lagopus L.)*, *(Ter-i-in-i-ak, Eskimo)*.

There are two varieties of this animal, common in these regions, the blue and the white, the habits of which, with a few exceptions, appear to be so like that of the red, black and silver-grey foxes, all of which were seen, that it will only be necessary to speak of them as a single species.

About the beginning of September the white fox began to appear in large numbers upon the coast, and shortly after those of other colour, which are much rarer, were reported as having been seen.

At this time the fur of all the foxes is very short, and that of the Arctic Fox is, for the most part, of slatish colour, though in some instances, almost white, with a few scattered black tipped hairs.

Spring traps were kept set throughout the winter, and a number of red and white foxes were taken, by which means we were enabled to note the changes in the colour of the fur.

Late in November the fur was still very grey, especially near the roots of the hair, and showed little change a month later. During

January the fur appeared to grow very fast and by the middle of that month was perfectly white, with the exception of small tufts of the old hair, which in a great many instances remained entangled in the new throughout the winter. It was also generally noted that the largest and best conditioned foxes had the best fur.

During the winter the fox depends almost entirely on the Lemming (Myodes torquatus) for subsistence, but during the seal breeding season may often be seen roaming over the ice in search of the young seal, and when very hungry will attack the older ones.

On visiting the traps one day it was found that a fox had been caught, but had by some means gone off with the trap. As it was supposed it could not go far it was tracked in the snow, but after walking five miles the attempt to come up with it was given up. Three weeks later this fox was sighted a few hundred yards from the observatory and was given chase by an Eskimo who soon captured it, when it was found the trap was very rusty and deeply imbedded in the leg.

Unlike the red fox the white species when caught will howl most piteously as it is approached by the trapper, and upon going up to it it immediately stands on the defensive and will fight most fiercely for its life.

After February 1st foxes became very scarce and few were taken, the last being seen on May 10th. A few remain on the coast throughout the year, but nearly all migrate to the interior, where they can enjoy the luxuries of young ptarmigan and other birds, besides the pleasure of scratching their backs upon small bushes when undergoing the difficult process of change of clothing.

ESKIMO DOG *(Canis Familiaris, Linn), (Kingmik, Eskimo).*

The Eskimo dog so nearlyr esembles the wolf (Canis Lupus occidentalis) it is difficult to describe it as other than that animal, excepting when in harness and under the lash of its master's whip.

When at liberty it may often be seen roaming over the country in search of the Lemming or other food, and appears only to care for its master for the food it may get from him.

There is only one redeeming quality in its habits, and that is its simple appetite; it will live a great length of time without food and is not at all particular what it eats, as the following list of articles which I have seen it devour will show :—An old cloth hat, a boot, part of a flannel shirt, part of a pair of trousers without the buttons, and a lot of greasy felt gun wads, which were seen the next day carefully placed beside a stone undigested. It may be added, *en passant*, these gun wads were subsequently used by an Eskimo for his gun. As might be supposed the dogs do not grow very fat, nevertheless they are often slaughtered for food during hard times, and their skins are made into clothing.

In harness the Eskimo dog appears as a different animal, it is then fed occasionally upon the skin of the walrus and other refuse, but woe betide the dog that refuses to pay for this food by pulling too lightly upon the load that is given it. Thrashing is then often far too good for it, it must pay with a part of its body, and carelessly going up to it the quiet, though enraged, Eskimo will take his knife and cut a small piece off its tail or ear and will as coolly return to the sleigh with the call "whoots," which means "get on."

Having a large Newfoundland dog with me, which was brought up on the ship from the Labrador coast, it was very interesting to watch its treatment of and by its Eskimo neighbours. From first to last the males were deadly enemies, my Newfoundlander disdaining to have anything to do with them, but with the females he was a particular favourite, thereby causing some most terrible rows in the camp.

REINDEER *(Rangifer Tarandus (Limn, Baird), (Took-too, Eskimo).*

The reindeer is only a summer visitor to the coast, arriving in the early part of April and leaving again for the interior in November.

The horns of those taken about April 10th were soft and a great many were covered with velvet. At this time of the year a great stir is noticed among the Eskimo, and in a few days all leave for the hunting-grounds a few miles inland where the deer are most plentiful, returning to the shore again about six weeks later.

The reindeer is undoubtedly the most useful animal to the Eskimo that is found in these regions; its hide is used for clothing and bedding, its horns for spear and arrow heads, and the lining of its belly for sewing thread, while the fat, which is usually melted down, is one of the greatest luxuries the Eskimo possesses.

In June the young are dropped, and during this month and July the deer is not molested as the Eskimo is then too busily engaged in seal hunting. In August the hunt again commences, and at this time the Eskimo secures all the skins he can for winter use; unfortunately, however, owing no doubt to the large number that are killed annually for their tongues which are shipped to the London market, they are not so numerous as formerly and many a poor Eskimo has to make shift with a few thin seal skins for his bed and the same for his clothing throughout the winter.

While exploring one day, a natural deer trap was found in the shape of a wide crevice in the side of a hill that had doubtless been formed by the action of frost. The sides of it were perpendicular and about twelve feet high, and in it were the skeletons of several deer, and one that had recently fallen in.

POLAR HARE *(Lepus Glacialis, Leach) Oak-a-luk, Eskimo.*

Like other varieties of the same species, the Polar Hare is a most timid animal, and is so watchful of its enemies that it can seldom be seen to any advantage, and is only shot as it passes, like a ball of snow, in its swift retreat; nevertheless, a few fine specimens were taken and added to my collection.

Although it undoubtedly remains here throughout the year, none were seen until the month of December, and from that time until the end of May in the following year, its well-known tracks could be seen in the snow in every direction. Its food consists of a number of small plants, especially the knotty roots of certain grasses, which it obtains by burrowing in the snow and moss.

HUDSONS BAY LEMMING *(Myodes torquatus Pallas: = Mus Hudsonius, Forster) Avingnuk, Esk.* :

This is the smallest of the quadrupeds found in these regions, and, apparently, only inhabits the coast where it is so numerous that by turning over a few stones, one or more are sure to be found. On a still winter's night, when everything appears hushed in sleep, this interesting little animal may be heard in every direction boring through the snow, and then stopping as if to take breath, and again returning to its labours. Then is the time its enemy, the fox, stands and listens a minute, and pouncing upon the spot where the boring is heard, cuts off its retreat and with little trouble secures its prey.

The fur of the Lemming is of a greyish colour in the summer time, gradually turning white as the winter approaches, but never becoming perfectly so. In some cases the skin was found perfectly hairless in parts that had been affected by a parasite which infests this animal.

Walrus *(Trichechus Rosmarus, Linn) Iviuk, Esk.* :

The Walrus is not numerous at any time in the Sound, and disappears altogether in July, not returning again until about the middle of November ; it is then eagerly looked for by the Eskimo, who may be seen exploring the ice from a neighbouring hill with their telescopes, and occasionally walking out to the open water when one is sighted.

During my stay here very few of these animals were seen, and of those taken, only one was an adult specimen, the others all being very young.

The tusks of the walrus are of great value to the Eskimo for spear heads, and for many other purposes, the ivory often being sawn into lengths and used in shoeing their sleighs.

Great Seal *(Phoca Barbata, O. Fab) Oog-jook Esk.*:

This is the largest of all the seals found in these waters, and next to the deer it is perhaps the most useful animal to the Eskimo.

It arrives in the Sound soon after the ice has broken up, about the end of June, and although never very numerous they are taken from that time until the Strait again fills with ice towards the end of October.

In common with other seals they are shot or harpooned either while they sleep on the ice or while swimming in the open water. The Eskimo say the Great Seal has never been known to breed here, and all those taken during my stay must have been over five months old.

The skin of this seal is used in making kyaks or boats, and harpoon lines of great length are made from it by cutting the skin in a narrow strip round the body, as you would peel an apple. It is also used for the soles of boots, the hair being first scraped off and the skin then dried in the sun, and afterwards going through a process of chewing by the female Eskimo.

Harp Seal *(Phoca Grœnlandica), (Kyro-lik, Eskimo).*

The Harp Seal, so named from a distinct mark of the harp of Erin upon its back, arrives in the Sound a little later than the Great Seal and is much more numerous, leaving again as soon as the ice approaches in October. It does not often take to the ice, but may be seen swimming a short distance from land and is seldom alone, there almost invariably being several together.

With the exception of one or two, all those taken were adult seals, the youngest being about four months old.

The skin of this seal, which is very large, is used in making wigwams and for the upper part of Eskimo boots.

ROUGH SEAL *(Phoca Fœtida Fab), (Natchuk, Eskimo).*

This is the most numerous of all the seals found in these waters, and constitutes the principal part of the Eskimo food.

It remains here throughout the year, but is scarce during the months of February, March and April.

The first young seal taken was on March 5th, and about this time several more were found. They are born on the ice where the snow is deep. the parent seal making a most comfortable house under the snow. These houses are not easily found and are only detected by a small mound slightly above the level of the snow.

It is often wondered how the seal may be seen to appear on the ice where only a short time before not a hole could be seen, and some writers on the subject have declared the seal makes a hole from the underside of the ice, by keeping its warm nose pressed against it. This appears so absurd that during my stay here a careful examination was made of all the seal holes that were seen, and in every instance they were found along the line of wide cracks that are constantly being formed by the ever changing tides. As will be readily understood the water between these cracks soon freezes and becomes covered with snow, and the seal keeps a hole open by constantly diving and returning again to breathe.

Many are the arts the Eskimo resorts to to capture this seal, and perhaps the best is by two hunters, one of whom lies down at the edge of the ice near some open water, while his companion remains about ninety yards further from the edge. Here he scrapes upon the ice with his spear and whistles in a low note, while the charmed seal, if there is one anywhere near, slowly swims towards the object at the edge of the ice, and when near enough is surprised with a charge of shot, a bullet or a spear.

RIGHT WHALE *(Balœna Mysticetus Linn).*

Only two of these whales were seen, and as the Eskimo seldom meddle with them little could be learned of their habits.

They apparently only pass here on their way to or from Hudson's Bsy, and will not attempt to make the passage while there is ice in the Strait.

Portions of what undoubtedly were the skeletons of three of these animals were found on the shore, and the Eskimo informed me that at one time, when there were more of their people living here, they would not hesitate to surround one of these hugo monsters in their kyaks, and with harpoon and floats would sometimes succeed in killing one.

NARWHAL *(Monodon Monoceros, Linn), (Uglung-war Esk).*

Commonly known as the Unicorn, the Narwhal is often met with in the Strait, and is much valued for its large ivory tusk which often measures five feet in length. Only one of these animals was seen late in the summer, and the remains of another were found on the shore, the tusk of which measured four and a half feet.

WHITE WHALE *(Beluga Catodon [L.] Gray), (Kelleluak, Esk).*

The white whale, though indigenous to the Strait, does not come near the coast until the ice begins to open, the first seen being on April 26th, when there was some open water about five miles from the shore. From this time they were often seen throughout the summer, sometimes singly, but oftener in small schools following the line of the coast. Then the Eskimo may be seen standing motionless at some prominent point, with gun ready waiting patiently for a shot. To one accustomed to extremely quick shooting, a white whale might seem an easy mark to hit, but with the inexperienced, to make the best of it, the bullet never seems to strike anything else than the place where the whales head was.

During the summer this animal forms a large part of the Eskimo's food, and is eagerly hunted by them.

BIRDS.

STONE CHAT *(Saxicola œnanthe L.).*

This is perhaps the most valuable zoological specimen taken during my stay in the Strait. It was the only one seen, and is described by Mr. Whiteaves, Palæontogist of the Geological and Natural History Survey of Canada, who identified all the birds in my collection, as being an adult male of a European species not previously recorded as occurring in Canada, though found in Greenland.

This active little bird was shot after a long chase on May 19th.

SHORE LARK (*Eremophila Alpestris, Forster*).

Arrived May 17th, mating June 1st, young fledged July 15th, was last seen on August 10th. This bird was very numerous during the summer.

WATER THRUSH (*Siurus nævius, Bodd*).

Arrived May 20th, mating June 1st, young fledged July 25th, last seen on October 1st. A great number of these birds were seen.

LAPLAND LONGSPUR: LAPLAND BUNTING (*Plectrophanes Laponicus L.*).

Arrived May 14th. This was the only specimen seen and taken

SNOW BUNTING (*Plectrophanes nivalis, L.*), (*Capenoir, Eskimo*).

The first Snow Bunting seen was on April 1st, and shortly afterwards they were very numerous. They were mating about May 25th, young were fledged about July 16th, and about August 23rd the adult birds appeared to leave, returning again a month later, and by October 21st all had disappeared.

RAVEN (*Corous Corax L.*), (*Tooloouk, Eskimo*).

The Raven is indigenous to the country, and although most of them appear to migrate southwards a few were seen throughout the winter. They were mating about May 25th, and the young were fledged July 15th,

This bird is the Eskimo's companion, following him everywhere in his hunts, and when a seal is shot will perch only a few yards from him and "caw" most vociferously.

They do not seem to understand the mechanism of a fox trap and are often caught in the act of taking the bait.

GYR FALCON (*Falco sacer, Forster*).

Arrived September 6th. They were not often seen until about September 15th, when a number were seen apparently flying south. The last seen was on September 20th.

ROUGH-LEGGED BUZZARD (*Archibutes lagapus, Brunnick*).

Arrived on May 15th. Were rather numerous throughout the summer. Fledglings seen on August 20th. Last seen on September 30th.

SNOWY OWL (*Myctea Scandiaca*), (*Ook-pi, Eskimo*).

Only two of these birds were seen in September, neither of which was taken.

ROCK PTARMIGAN (*Lagopus rupestris Gmelin*).

Arrived May 11th, mating June 30th, when they were very numerous, young fledged August 18th, and last seen on October 30th.

RING-NECKED PLOVER *(Oegialites semipalmatus, Bon. ;)*

First seen on June 1st. Mating, June 10th. Young fledged, July 12th. Last seen, September 25th.

These birds were very numerous throughout the summer. One was seen to pick up its young and fly some distance with it.

RED PHALAROPE *(Phalaropus fulicarius, L.)*

First seen on May 31st. Several of these birds were brought to me during the month of June; but after July 1st, none were to be seen.

PURPLE SANDPIPER *(Tringa Maritima, Brunn.)*

Only one of these birds was seen and shot on May 27th.

WHITE-RUMPED SANDPIPER : BONAPARTE'S SANDPIPER *(Tringa Bonapartii, Schlegel.)*

None of these birds were found breeding, but a few were seen after July 1st; and about August 10th, very large flocks arrived, remaining until September 20th, when the last of them were seen.

BRANT GOOSE *(Bernicla brenta, Stephens.)*

The Brant Goose does not breed here. A few were seen in company with Hutchins Goose in their flight southward, on September 6th, and one was brought to me by an Eskimo on December 1st.

HUTCHINS GOOSE *(Bernicla Hutchinsi, Richardson.)*

This bird, in company with the Brant and Snowy Goose, arrived in great numbers on September 6th, and remained here five days, all disappearing when the wind shifted to the southward.

SNOWY GOOSE *(Chen hyperboreus.)*

Thousands of these birds, in company with those just named, arrived here during a gale on September 6th, and were so tame that seventy were shot in a few hours with very little trouble. They remained here five days, when a steady breeze springing up from the southward, they all disappeared in a few hours and none were seen after September 12th.

LONG-TAILED DUCK *(Harelda Glacialis, L.)*

The first of these birds seen was on June 1st, and the first fledglings found was on August 31st.

This is one of the most numerous and certainly the most noisy duck that visits these regions; its long-drawn note of ar-ar-ow-oo may be heard in every direction.

Its eggs were found on the margin of ponds, from which small streams ran to the sea, and through these the parent bird was seen to conduct her brood when about ten days old. The last of these birds seen was on November 10th.

HARLEQUIN DUCK *(Histrionicus torquatus, L.*

The Harlequin Duck was most numerous during the month of June, but after the end of that month, none were to be seen. Apparently this bird does not breed here.

KING EIDER *(Somateria spectabilis, Leach.)*

Large flocks of these birds arrived about May 5th, almost darkening a small piece of water about five miles from the shore. About June 1st, pairs were seen to visit small lakes inland, where, as soon as the ice had melted round their shores, the eggs of this bird were found in nests of down on small, mossy islands.

The King Eider lays from four to six eggs, and in some instances continued to lay in the same nests after they had been robbed of the first two or three eggs.

Two nests with eggs of this bird were found several hundred yards from the water upon a high ledge of rock from which it would be impossible for a young bird to descend without assistance.

The first young seen was on August 25th, and like the Long-tailed Duck the parent bird in a few days conducts her brood to the sea.

The last of these birds seen was on November 30th.

HERRING GULL *(Larus Argentatus, Brunnich), (Nowia Esk).*

First seen on April 20th. Was mating June 1st. Young were fledged on August 12th. Last was seen on November 15th.

This bird is very numerous throughout the summer and its nests and eggs were found beside those of the King Eider on small, mossy islands.

COMMON TERN *(Sterna hirundo, L.), Emo-cootatia Esk).*

Eggs and specimens of these birds were brought to me by Eskimo on July 20th, from a small island about six miles from the coast. These were the only ones seen during my stay here.

GREAT NORTHERN DIVER: LOON *(Colymbus torquatus, Brunnich).*

The first of these birds seen was on June 1st, and the last seen August 20th. None of the young of this bird were found, and I think that very few breed here.

RED-THROATED DIVER *(Colymbus Septentrionalis, L) Coxzow Esk.* :

This bird arrived about June 20th and was often seen during the summer.

One nest only of this bird was seen a little above high-tide mark, and the Eskimo informed me they could seldom be found.

On August 7th, some fledglings were seen, and all had disappeared by September 28th.

BLACK GUILLEMOT *(Uria grylle, L.)*

This interesting little bird is seen here throughout the year, being most numerous during the summer.

During the coldest weather it was often taken on small pieces of water, where the ice had been broken by the ever-changing tides.

Quantities of eggs of this bird were brought to me by Eskimo from an island about four miles from the coast, and fledglings were seen on August 10th.

LITTLE AUK *(Mergulus alle, L.)*

A small number of these birds were seen some distance from the shore during the summer, but nothing could be learned of them. One specimen was taken.

In conclusion it may be well to add that with the exception of the Snowy Owl, specimens were taken of all the birds noted herein, and I regret very much that more time could not be devoted to the study of these interesting branches of the Natural History of Prince of Wales Sound.

Prof. Wright enquired whether Mr. Payne had seen any of those extraordinary migrations which had been observed as in the case of the Lemming.

Mr. Payne had not noticed any such changes in their movements. So far as he was aware none had been observed in North America.

Dr. Ellis read a paper on "The Chemistry of the Natural Waters of Ontario."

TENTH MEETING.

Tenth Meeting, 22nd January, 1887, the President in the Chair.

Exchanges since last meeting, 28.

The following were elected members:—R. Dawson, Henry Steele, John Horwood, C. D. Lennox, T. Simpson, B.A., M.B.

Dr. Daniel Wilson read a paper on "Some Stone Implements from Lake St. John, Que."

After referring to the system of barter indicated by the dispersion of the flint implements, he said that from the Gulf of Mexico to the farthest north there was not the slightest evidence of fire having been applied. At no period in the history of this continent were there any indications of the slightest knowledge of the metallurgic art. So that man has not existed on this continent, except in a low state of savage life.

Prof. Wright asked Mr. Macallum, who was present and had just returned from Mexico, whether he met with any stone implements in Mexico.

Mr. Macallum had met with them in considerable abundance, such as stone axes, arrow heads. The colour was a dark-brown, darker than that of those exhibited.

Mr. A. B. Macallum, B.A., read a paper on "Theories of Heredity."

ELEVENTH MEETING.

Eleventh Meeting, 29th January, 1887, the President in the Chair.

Exchanges since last meeting, 30.

Messrs. James Bain, jun., and John Notman, were appointed Representatives of the Institute on the Board of the Industrial Exhibition Association for the present year.

The Council announced the election of the following as Associates:—A. F. Wickson, Ernest Wilby, D. A. Hewitt, W. C. Tilley, W. L. Symons, J. P. Hynes, Harry Sproatt, Henry Simpson, J. F. Brown, F. H. Herbert, F. Otter, Charles Langley, G. T. Goldstone, F. F. Mallany, W. A. Smith.

The following were elected members:—T. M. Logie, B.A., W. B. Ewing, James G. Ramsay, J. B. Millar, Edward Thomas Carter, Gerald Fitzgerald, W. W. Fox, E. R. Parkhurst, Dr. John Hall, Charles B. Petry.

Mr. James T. B. Ives, F.G.S., read a paper on "Geology in the Public Schools," of which the following is an abstract:—

The author produced evidence that Ontario possesses vast mineral resources; and that those resources are not receiving the attention which they demand; that the dissemination of geological knowledge would promote their development; and further, that the Public School system of the province is adapted to secure such dissemination. At the close he exhibited an appliance, designed to assist the Public School teacher in conveying to the minds of his scholars the first principles of structural geology:—

"It is designated the Strata Map and consists of several layers, or *strata*, of variously coloured cardboard or other suitable material, hinged in the form of a book or otherwise put together. The SUPERPOSITION of the STRATA of the earth's crust is represented by that of the layers of the map; and it is thus seen that the order of succession of the *formations* cannot be reversed although either may be absent.

"Portions of all the *strata*, excepting the lowest, are removed according to a definite plan; a larger proportion being removed the higher the *stratum* occurs in the series. By this means a pattern is produced corresponding with the geological map of the area represented. It being pointed out that the exposure of the several geological formations is due to an analogous cause operating in nature; a correct and comprehensive conception is obtained, of the nature and operation, of the phenomenon known to geologists as DENUDATION.

"Where, in descending order, the successive *strata* make their appearance projecting beyond those by which they are overlaid, OUTCROP is illustrated. The steps formed by the thickness of the card *stratum* at the same time illustrate another phenomenon and its verbal sign, these being miniature ESCARPMENTS.

"The term DIP, and that which it expresses, may be illustrated by tilting the map; as a whole, when all the *strata* will *dip* towards the lower end; or by placing a small object beneath some of the *strata* and pressing them down on either side of it, when those *strata* will *dip* from it in each direction. In the latter case the upraised portion will represent what is known in nature as an ANTICLINAL ridge. If a second object be placed at a short distance from the first and the strata be depressed between them a SYNCLINAL trough will be formed

"Whilst illustrating DIP, another term usually very perplexing to learners, may, by means of the Strata Map, be most readily explained, viz.: STRIKE.

"By removing portions of overlying *strata* geological INLIERS are clearly exhibited; and OUTLIERS are shown by means of a portion of the *stratum* to which they belong cut to the shape of the *outlier* to be represented and attached to the underlying *stratum* in the proper position.

"The *strata* of the map being all *superimposed*, horizontally, one upon the other, that condition of things known to the geologist as CONFORMABLE stratification is exhibited, and UNCONFORMABILITY is easily explained.

"Where IGNEOUS rocks occur within the area represented, the space so occupied is marked by a distinctive colour indicating such intrusion. But as it is usually impossible to say whether underlying *stratified* rocks are pierced thereby, their presence is not indicated on underlying *strata*. In any case where, by the operations of the miner or otherwise, such rocks are found to exist, the fact may be indicated on any stratum affected.

"The Strata Map may be made of any size, and may consist of a small number of layers representing groups of formations or of a large number representing the several formations or their subdivisions.

"Upon the various *strata*, FOSSILS, characteristic of the formation represented, may be figured and named.

"The LITHOLOGY of the various formations may be described thereon, whether limestones, sandstones or clays, &c., and whether used, or capable of being used, in the arts and manufactures.

"The localities where economic MINERALS occur may be indicated by numbers corresponding to a key in the margin of the map in which those occurring in the area are enumerated.

"The THICKNESS of the beds represented may be expressed in feet where known. Where, by well boring or otherwise, it has been ascertained that certain subterranean strata are absent in a particular locality, corresponding portions of the stratum affected may be cut away or a note to the effect placed thereon.

" By cutting away portions of the *strata* at the margin a LEDGER INDEX is formed similar to that of an alphabetically indexed account book showing the colours of all the strata in succession. On these spaces the names of the several formations represented are written, and their approximate maximum thickness within the *area* represented is stated."

Besides the survey map of the Dominion, geologically coloured, he illustrated his subject by means of an outline map of the province, on which he had indicated by distinctive colours the various minerals at present worked or known to exist, in localities ranging from the County of Carleton in the east to the Lake of the Woods in the west. In evidence of the variety and wide distribution of the minerals of Ontario, he quoted the reports of the Geological Survey, the Bureau of industries, Ontario, and a valuable synopsis, compiled by Mr. H. B. Small, of Ottawa. The same authorities were cited in proof that this Industry is not receiving due attention, and the sketch map on which he had indicated the known localities was appealed to, as showing how much of the province still remains untouched by the miner. He showed how the dissemination of a knowledge of stratification and its attendant phenomena would check useless and wasteful operations, and at the same time promote judicious prospecting and mining. He looked to the diffusion of such knowledge as a wholesome bar to the spirit of mere speculation at present so rife here, as well as in the States. The author advocated the introduction of geology into the Public Schools, not as a separate subject, but as an expansion of geography, in its physical branch, contending that the latter cannot be taught intelligently or intelligibly without explaining the causes which have operated to produce the present contour of the earth's surface. He gave a brief resumè of the work done at the colleges of the province where geology is taught; at the High Schools, where physical science is greatly at a discount, as evidenced by extracts from the High School Inspectors' reports, and at the Normal Schools. Chemistry, zoology and botany being taught in the latter, he contended that the teachers in training would not find it difficult to acquire so much knowledge of geology as would enable them to impart it, in an elementary manner, to the pupils of the Public Schools. The curriculum of the Public Schools was briefly considered. Statistics were given from the report of the Minister of Education, showing the relative attention given to the various subjects. Geography being taught to more than two hundred and eighty thousand pupils, out of the total number of four hundred and sixty-six thousand on the register, the author inferred that the systematic inculcation, in connection with that subject of elementary structural geology, would be of incalculable value to the Province in the proximate future, and of great immediate service. He combated the view that the subject is too abtruse for Public Schools, outlined the scope of such teaching and its method, and made a suggestion as to the course to be adopted in initiating the introduction of geology into the Public Schools.

Mr. Boyle thought that the map would be very useful in teaching geology. As an old teacher, however, he did not think that it would be advisable to place the subject of geology in the curriculum for Public Schools. The subjects were already too numerous, and he did not see how geology could be introduced with advantage. In accordance with the representations of a deputation of the Natural History Section, the study of natural history had been put on the Normal School programme, but practically no attention was given to it. The very slight acquaintance that it was possible to impart, under the circumstances, was of little value. In order to have it taught with efficiency, the teacher should be saturated with the subject.

Mr. J. L. Hughes, Public School Inspector for Toronto, agreed with Mr. Boyle as to the value of Mr. Ives's map for purposes of illustration. The subjects on the Public School curriculum were already too numerous. It was impossible to teach them all thoroughly. Nearly all the subjects specially intended to develope the observing faculties of pupils had been suffered to drop out. It was true that geology was of great utility, but a study should not be put on the programme merely on account of its utility. He thought that the branches taught in the school should vary according to the wants of the locality. Steps should be taken to allow the local authorities an optional power in regard to certain subjects, so that those may be taught that were best suited to the circumstances of the place.

Dr. Hamilton thought that the subject of geology should be made a prolongation of physical geography. As to the introduction of the snbject into the classes of Mechanics' Institutes, it would be of very little benefit, owing to the inefficient management of classes by those institutions.

Mr. Macallum had come to the conclusion from his own experience that geology was a subject that should not be taught in the Public Schools. He was not in favour of local options, but thought that a strict rule as to the subjects to be taught should be made uniform through the province. It may be taught in the High Schools, and made optional with them. Chemistry, however, should have the precedence. He agreed with Mr. Boyle that to teach efficiently a teacher should be saturated with the subject.

The President communicated a paper from Prof. Campbell, of Montreal, "Etruria Capta," Part II., "The Eugubine Tables."

The President stated that he presented many points to Prof. Campbell that he had not been able to solve to his (Mr. VanderSmissen's) satisfaction. Should these not be solved, he considered that Prof. Campbell's theory must fall to the ground.

Mr. Boyle presented a very remarkable Indian pipe of curious workmanship, found on a farm in the western part of the Province. He stated that it was one of the most interesting specimens of the kind he had ever seen.

A letter was read relative to an offer of the remains of the Mammoth lately found at Eglinton. A tooth was at present in the Museum of the Academy of Science at Buffalo, but the owner offered to give it to whoever would find the rest of the body.

TWELFTH MEETING.

Twelfth Meeting, 5th February, 1887, the President in the Chair.

Donations were announced from Dr., Rosebrugh of "The Electrical World for 1886," and from Lieut. A. R. Gordon, R.N., of Seventeen Skins of Arctic Birds, collected on the shore of Hudson's Strait, for which thanks were tendered.

Exchanges since last meeting, 27.

The following were elected members:—G. S. Ryerson, M.D., Wallace Nesbitt, A. Percival Will.

Prof. Dunlop read a paper on "The Quichua Language."

The Quichua language, spoken by the Incas, or ancient native rulers of Peru, previous to the conquest of that country by the Spaniards, under Francisco Pizarro. The paper was strictly philological and dealt altogether with the grammar of the language, going as fully into a detailed account of its structure as the time would allow. The Quichua belongs to the agglutinate order of languages, and differs greatly from those of the Aryan and Semitic type, as may be supposed. It had its cradle in the districts around the ancient city of Cuzco in Peru, and it was the policy of the Incas to introduce it into every country which they conquered. Thus its use was gradually extended over the vast region from Quito in Ecuador on the north, to the boundaries of Araucania on the south, and from the Pacific to the Atlantic, exclusive of Brazil, an area of some 3,600,000 square miles. The conquered tribes nearly all spoke dialects of Quichua, which occupied, to the literary dialect of the capital, much the same position that the Prâkrits, or dialects of modern India, do to the literary and sacred Sanskrit. Thus the people of Quito spoke a dialect which differed scarcely at all from that at the capital; no greater difference subsisting between them than subsists between the Queen's English and the dialect of Yorkshire, if indeed there was so much. In the northern and central parts of the sierra of Peru the Chinchay-Suyu was spoken. The Yunca was the language of the Peruvian coast, the Lama of the tribes near the great River Huallaga and the Cauqui of the people of Tauyos in Central Peru. Round the shores of Lake Titticcaca the Aymara language is still spoken, from the city of Puno to the south of Bolivia. Aymara is certainly very different from Quichua in pronunciation, but not more than Lowland Scotch from English south of Tweed, the vocabulary being on the whole the same, and the grammatical construction is identical with that of Quichua. Further south, in Tucuman, in the Argentine Republic, the Calchaqui, a variety of Aymara, is spoken. With the exception of the Lama, which is a branch of the great Tupi family of languages, all these dialects, and a large number more, are from one common stock, and Quichua is to be considered the elder sister and representative of the group, even if we do not regard it as the parent of them all. During the period of Inca ascendancy, Quichua superseded all the other dialects as the language of the governing race; it was the language of a people far advanced in civilization; it was assiduously cultivated by learned men for several centuries; and it may therefore be selected as the most perfect of the extensive American group of languages. Hence its importance to the philologist. Through the rapid diminution of the aboriginal population, and the constantly increasing corruption of their ancient tongue, through the substitution of Spanish for Quichua words, the introduction of Spanish idioms and the loss of all purity of style, this language, once so flourishing, which was used by a polished—and we might even say splendid court—and a well-established Government, which was once spoken throughout a vast empire, is fast disappearing. Ere long, perhaps, it will entirely fade away from the memory of living generations. With it will disappear the richest form of the great American group of languages—no small loss to the student of philology. With it will be lost all the traditions which yet remain of the old glory of the Incas—all the poems, elegies and love songs which stamp the character of a once happy people. The paper closed with a brief account of Quichua literature, a couple of short fragmentary specimens of which were translated, an analysis of the most important Quichia drama "Ollautay," and a translation of its most interesting scenes being promised on some future occasion.

T. B. Browning, M.A., read a paper on "The Alaskan Boundary."

He entered into the history of the dispute between the United States and Great Britain, and described the position which Russia occupied in the question. He said there was no mention of dominion over sea in the treaty. The rights conceded were expressed to be over the firm land and islands adjoining. Authorities were cited to show that it was the custom of nations when seas were conveyed or presumed to be conveyed to specify them in the grant, and therefore the seizure of a British vessel for trespassing on the waters off Alaska could scarcely be defended. Under the convention of 1825 Britain had rights in the North Pacific of commerce, of navigation, of fishing, which both in the Atlantic and Pacific includes seal hunting, of landing on unoccupied coasts—a fifth right respects refuge in stress of weather. The Pacific Ocean was then to Britain not a *mare clausum*, but a *mare liberum.* The paper also contained a description of the eastern limit of the territory, and showed the difficulties of accurately defining it.

THIRTEENTH MEETING.

Thirteenth Meeting, 12th February, 1887, the President in the Chair.

Exchanges since last meeting, 25.

The Council announced the election of the following as Associates :—Frank Douglas, A. H. Gregg, George W. King

Dr. Scadding read a paper entitled "Canada in Sculpture," and exhibited a photograph of a marble statue of George II. in the Senate house of the University of Cambridge in England, which represents the King as a Roman general or imperator, crowned with laurel, and encircling with his right arm a globe, inscribed with the word Canada, in rather large characters, the whole being commemorative of the conquest of Canada in the reign of this king. This photograph was taken expressly for the lecturer, the statue in the Senate house having been never before copied in this way. The smallness of the scale, however, does not allow the word Canada to be visible to the ordinary eye. Dr. Scadding also exhibited a photograph of the graceful idealization of Canada in the grand group entitled America, by the sculptor, John Bell, at the north-west angle of the lower platform of the Prince Consort memorial in London. This fine figure of Canada, who is seen "pressing the Rose of England to her breast," was expressly prepared for the illustration of this paper by Mr. Lemaitre, 324 Yonge street, who skilfully detached it from a photograph of the general group and enlarged it.

In addition to the photographs mentioned in the paper, Dr. Scadding exhibited an engraving of the interior of the Senate House of the University of Cambridge, showing the four statues; a large medallion with heads of George II. and Queen Caroline facing each other on the obverse, and on the reverse their seven sons and daughters; an engraved portrait of Queen Caroline; a two pound gold piece (1739) of George II. inserted in a contemporary silver cup, and having, in addition to the usual titles of the king, the following:—*Brunsvicensis et Luneburgensis Dux: Sacri Imperii Romani Archi Thesaurius et Elector*, abbreviated thus: B : ET : L : D : S : R : I : A : T : ET : E. Also an engraving of the seated bronze figure of the Prince Consort in the Memorial.

C. Gordon Richardson read a paper on "Dextrine Maltose in Beer-Worts," of which the following is an abstract:—

When malt is acted upon by the peculiar ferment of malt called diastase it breaks up into dextrine and maltose. The proportion which these two bodies when found will bear to each other depends upon three things: The heat at which the mash is made, the length of time it is permitted to stand, and the diastatic capacity of the malt itself. Dextrine is the first product of diastase—it is, so to speak, the half-way house between starch and sugar. To the brewer it possesses many valuable qualities. It ferments but slowly, lends palate-flavor and body to the beer, and also those keeping qualities so essential to the production of sound stock ales. To the maltose on the other hand, the brewer is indebted for the source of the alcohol which finished beer always contains, in more or less quantity. On the due proportion, therefore, between these two bodies, maltose and dextrine, the future history of the beer largely, if not wholly, depends.

All authorities agree in assigning 145° F. as the temperature of the malt infusion or mash most favorable to diastatic action, and consequently to the production of maltose. But, unfortunately, a great difference of opinion exists amongst the standard authorities as to the temperature most favorable to the increased relative proportion of dextrine to maltose. The English authorities declare in favor of low heats, viz., below 150° F., and the American chemists in favor of high, viz., above 150° F. Now since all diastatic action ceases at a heat of 172° F.—diastase itself being destroyed at that heat, it might reasonably be inferred that as we approached this maximum limit we should find the diastatic action decrease, and if such were the case, only the half-way stage in the conversion of starch, viz. dextrine, would be attained, and the practical test of experience bears this reasoning out. The English chemists base their reason for advocating low heats for the formation of dextrine upon similar chemical considerations; that, as at very low temperatures diastase is inactive, so by a lowering of the mashing temperature we limit the action of diastase to the production of dextrine. But this is not borne out by experiment, and the fallacy lies in confounding the checking of too vigorous quantitative action of diastase by the influence of low temperature with the qualitative and destructive influence of high heats upon the nature of diastase itself. Although 145° F. is the temperature most favorable to diastatic action, yet at that heat the relative proportion of dextrine and maltose vary very considerably with different malts, and according to the results obtained from a large number of test brews and analyses, made by the writer, seemingly in direct proportion to the diastatic capacity of the malt used. The ordinary standard of diastatic capacity of malt is the absolute amount of starch converted into maltose, at a given temperature, and in a given unit of time, each analyst having to make his own standard, but the relative proportions of dextrine-maltrose obtainable at given temperatures is of far more consequence, ordinarily, to the brewer than is the absolute convertible capacity of the diastase contained in a given sample.

In view of the fact that under the present system of estimating the diastatic capacity of malt, no comparison can be made between the results obtained by different observers, each analyst having to make his own standard, and the doubtful utility of such returns to the prudent brewer, the writer is led to propose the following method of analysis and stating results. In brief, to take a fixed quantity of malt, infuse at a given temperature, preferably 150° F.; keep at that temperature half an hour, then boil. Estimate the dextrine and maltose formed and return as such. And the diastatic capacity to be judged by the relative proportions of these two bodies, as referred to a certain fixed ratio. This latter the writer trusts shortly to be able to suggest, or at least to produce some data for fixing the same, from the results obtainable from a series of experiments he is now conducting.

In answer to an enquiry of Dr. Bryce, Mr. Richardson said that the result was much affected by the difference in the quality of the grain. The English barley was heavy in albuminoids, which was counteracted by the infusion of more hops. The Canadian barley through manuring also contained more albuminoids, which affected the diastatic action. The effect of free oxygen was so small as not to be noticed in practical work in England.

FOURTEENTH MEETING.

Fourteenth Meeting, 19th February, 1887, the President in the Chair.

The Curator announced a donation from Mr. Finlay McCallum, of Milton, of a valuable carved Stone Pipe, for which thanks were tendered.

Exchanges since last meeting, 79.

Mr. R. H. Bethune was elected a member.

The following paper was read by W. A. Douglas, B.A., on "The Antagonism of Social Forces."

When Adam Smith pointed out what a vast advantage accrues to mankind from the division of labour, he first gave a clear indication of the grand harmonies existing in society. Other writers have followed in the same direction, and with much beauty and eloquence have pointed out what an inestimable blessing society is to itself. This department of economics has received very ample treatment. Indeed, so much has the attention of writers been fixed on these harmonies that a very large majority teach either explicitly or by implication that harmony prevails throughout all our social organization, for they make no mention of antagonisms.

Some writers, indeed, go so far as to deny that there are antagonisms, and the few who have noticed and pointed out their existence have done so in a manner much more brief and meagre than their importance deserves.

In his celebrated illustration of the pin-makers, Smith showed that by the sub-division of labour the product was increased between two and three hundred-fold. In the same way the nail-makers' product is also increased. When, therefore, the pin-maker exchanges with the nail-maker each gives more and each receives more, each enriches and each is enriched—the benefit is mutual. This is harmonious trade—toil for toil, burden for burden, service for service, reward for reward, enrichment for enrichment.

I shall endeavour to show (first) that there exists another kind of trade, not harmonious—mutually enriching, but antagonistic—enriching one by the impoverishment of another ; and (second) that this antagonistic trade is one of the most important factors in determining the condition of the bulk of humanity.

To prove the existence of such antagonism I ask attention to the following question :

In what length of time could society, by the utmost exertion of industry and frugality, accumulate sufficient supplies to maintain all succeeding generations free from toil? Obviously never. Each season brings its share of toil, and each year we consume the bulk of the product. Wonderful as have been the applications of steam and electricity, we have no indication that humanity will ever be exempted from toil. The physical law is inexorable : "By the sweat of thy brow shalt thou eat bread." But a portion of the race now enjoy incomes which exempt them from toil, and with every guarantee, so far as our laws and customs can guarantee anything, that such exemption shall continue to the end of time

What are the inevitable conclusions from these two considerations?

First.—Since no man or number of men can produce sufficient supplies to maintain them for all time without further toil, therefore, that part of society which enjoys everlasting incomes that require no toil from their recipients for their maintenance, possesses the power of appropriating an amount of wealth that could not by any possibility be the result of its own productive effort.

Second.—All society cannot possibly live for all time without toil; some now possess that power. Therefore some enjoy a privilege from which others by inexorable physical law must be for ever excluded.

Whence comes it that we see this extraodinary division in society? One part empowered to live without toil, another part doomed to everlasting toil. This I shall now try to make plain.

Let us first try to ascertain what is the law of distribution of the products of labour. Two men settle on the prairie, each taking a section. One section continues to be a farm, the other becomes a town site. After thirty years the farmer has a property worth, say, three or four thousand dollars, while the land-owner's property is worth, say, three or four hundred thousand dollars. The toil of the farmer has exceeded that of the land-holder a thousand fold; the reward of the land-owner has exceeded that of the farmer a thousand fold. Reward is inversely as service. The distribution is not according to production, but it depends mainly on the *increase of value*. To understand, therefore, the laws of distribution we must examine the nature of value.

Why has a fresh egg value and an unseasonable egg none? Because the former possesses that quality called "utility;" the latter does not.

Why has air, which has much utility, no value, while a diamond, with little utility, has very great value? The air is super-abundant and immediately accessible, while diamonds are scarce.

Value, therefore, may arise in two ways. First, it may come by the production of utilities that are scarce, or, second, it may arise from the scarcity of certain utilities.

Machinery is scarce. Toil takes the ore and converts it into a machine. This is one way of acquiring value by the path of utility.

Let a drought come until water sells, as it has sold sometimes in Australia, for three shillings a bucketful; this is another way of acquiring value; it arises from the increased scarcity.

In the first case an increase of value caused by the increase of a utility, as in the production of machinery, is an increase of wealth. In the second when the value is the result of scarcity, as in the increased value of water from drought, the increased value is an indication of increased poverty.

To distinguish these two kinds of value, let us call the former "toil-produced value," and the latter "scarcity value." The commodities included in the former are our food, clothing, buildings, machinery, etc., while the scarcity values include minerals, forests, water-power, land, etc.

As distribution takes place according to the "production or growth of values," and as values arise in two different ways, there are two different ways in which a person may acquire wealth:

1. By producing utilities, as houses, clothing, etc.
2. By holding some natural commodity that acquires value by becoming scarce, such as lands, mines, etc.

The first method requires toil. We can convert the crude ore into a machine, the raw cotton into a garment, only by toil. But the increased value of mines, or at least a large portion of these values, is due in no way to the labour of the holders of these lots or mines.

Our present method of distribution, therefore, has the following most momentous results:

First,—One part of society obtains a share of the products of labour only after it has produced utilities, after producing wealth; the other portion obtains wealth by the growth of scarcity values that requires no toil. Hence we see the division of society into toilers and idlers, or, what is the same thing, the imposition of the whole toil of maintaining society on one part of the population, allowing the rest to enjoy a share of the product, to the production of which they have contributed no effort.

Labour-produced values are transient. The food of this season will be consumed by the next, the clothing will soon be worn out, buildings will crumble and decay, our dwellings and clothing will quickly become soiled, machines will rapidly wear out. To replace the worn out or consumed, to repair the broken or decayed, requires toil, and we have no evidence that we can ever be free from the necessity for toil.

But some of the scarcity values do not possess this transitory character. The value of a city lot continues as long as the population clusters round that spot. It requires no effort to maintain its value, for it is not subject to decay or consumption, like other utilities. To allow such values to be appropriated by individuals, therefore, allows them not merely to become rich without effort, but allows their wealth to continue undiminished for ages. The division of society into toilers and idlers is thus perpetuated.

Let a drought come till water becomes a salable commodity, then the populace become poorer in water. If a few individuals possess some unfailing springs, then the increased value of water would render these persons richer. Let population increase till land becomes relatively more scarce, the people are poorer in land ; but values advance and the holders become richer. Here we notice a movement in society not mutually enriching, but enrichment of one part accompanied by, and as the consequence of, the impoverishment of the rest of society. This is a movement not harmonious, but antagonistic, enriching one by impoverishing another.

Scarcity itself is a calamity. To be cooped up in tenements is not the kind of life that is resorted to of free choice ; a breathing space would be no small fortune to many in our most congested centres of population. But by our present system this calamity is not simple, but compounded and intensified.

Let population become dense, and we must not only crowd each other to the degree of discomfort and inconvenience, but we must furnish the owner of the land with wealth, in some cases to an enormous amount ; we must board, lodge, and furnish him and his family, it may be in princely style. Two calamities—first, crowding ; second, tribute to idleness. First, impoverishment in space ; second, impoverishment in surrender of product to a non-producer. The calamity is compounded.

But this is not all. The division in society is still further intensified by another characteristic of the law of values. With increased population there is diminished competition for the sale of lands, forests, mines, and water privileges. But increased population facilitates production of some commodities in two ways—first, by permitting better organization, and second, by permitting the more extended use of machinery. Hence, in the sale of labor-produced commodities there is intensified competition. While we witness the values of town lots advance from almost nothing per acre to sums ranging amongst the millions, we at the same time see the price of steel rails decline from two hundred and fifty dollars per ton to one-tenth that figure. The holders of scarcity values therefore become richer in a compounded degree—first, by the advanced price of their own possessions, and second, by the diminished price of the commodities with which they are paid. As the brokers say, the market is "bulled" when they sell and "beared" when they buy. Thus is still further widened the breach between the toiler and the non-toiler.

One of the most intense passions of man is for wealth. For the gratification of this passion we see him on the one hand using every device to increase production, and thus enrich, at the same time by allowing the appropriation of the scarcity values by individuals we see a disposition to push the scarcity values to their utmost limit, thus tending to impoverish the producer for the benefit of the non-producer.

If I have correctly interpreted these phenomena I have shown why it is that our social development presents such remarkable contrasts—toil degraded and impoverished, while many enjoy lives of luxurious idleness, why every city on this continent presents the same features—ostentatious wealth at one end and penury at the other; and I have shown further that our social mechanism is not arranged according to the principle of mutual assistance and mutual elevation; but that we make the advantage of one part of society dependent on the degradation and impoverishment of another part. The scarcity values of our mines, our town sites and other natural opportunittes have risen to enormous figures. These values are increasing and persistent. What is the relation of these values? What is the meaning of a ground rental of ten thousand dollars yearly? It means, on the one side, an everlasting surrender by the toilers of the products of their labour to the value of ten thousand dollars yearly, and on the other side, the appropriation of these products without the obligation to render any service in return.

Alas! how little knowledge of these simple but far-reaching principles has been manifested by those in whose hands have been intrusted the destinies of nations. In the settlement of the new territories of this continent one of the grandest opportunities ever offered to mankind to lay the foundation in such a way that society would develop harmoniously has slipped by. But what do we witness everywhere? The obligation of the toiler to yield up his product to a number of his fellow men, who are thus relieved more or less from the necessity to toil. As population increases, this obligation increases; the mortgage on labour becomes greater and greater. Is it not true that labour is now mortgaged to the finger-ends? And is it not also true that no amount of industry, frugality, improved education or better organization can remove this obligation? The only means of escape is by the resumption of the scarcity values by the public and thus cutting off the possibility of any able-bodied man escaping his fair share of toil. To remedy our method of distribution we must abolish the law of "distribution by values" and substitute the true law, "to each according to his work."

Mr. Browning objected to Mr. Douglas's division of individuals into classes, toilers and idlers, as invidious. He did not know of any class that were either all toilers or all idlers. The ordinary meaning of the word toiler was a mechanic, or any one that lived by manual labour; if the professional class was included, the class of idlers would be reduced to a very small number, as there were very few that lived entirely without some kind of labour, so that to include all under these two classes would be virtually to include all in the one class and none in the other. He objected also to the division into utility and scarcity as components of value.

Mr. Douglas said that every person that produces something for his fellow men is a toiler, but there were individuals who produced no more for the benefit of society than if they were chloroformed on the first of January and remained so to the last of December. In his remarks he did not propose any levelling of incomes, but to point out the existence of antagonisms.

Mr. Elvins expressed the pleasure he felt in having the question put before them in so clear a light. He had spent much time in endeavouring to solve the question. The only difficulty with him was how to find a remedy. He hoped that thoughtful men would give the subject due consideration, and find a remedy for the evil before it was too late, and thus obviate a great and impending danger.

Dr. Hamilton agreed with the reader of the paper as to the existence of the antagonisms, which had indeed long agitated the world. He referred to the agrarian contests in the Roman State, the troubles connected with the Gracchi, and the Servile wars, so that the question was really a very old one. He thought that the gentleman who had read the paper had clearly made out his case, though he had not shown the remedy.

Mr. Ives thought that the subject was one of great practical utility. He gave from his own experience, when a tenant of the Duke of Portland, an instance confirming the views of the reader of the paper.

Mr. J. J. Kelso read a paper on "The Necessity of a Society for the Prevention of Cruelty in Toronto."

He pointed out that there was no society of the kind at present in existence in Toronto, and he proposed the establishment of one as a general humane association, having before it the following among other objects:

To stop cruelty to children: to rescue them from vicious influences and remedy their condition. The beating of animals; overloading street cars; overloading waggons; working old horses; driving galled and disabled animals. To introduce drinking fountains; better laws; better methods of horseshoeing; humane literature into schools and homes. To induce children to be humane; everybody to practise and teach kindness to animals and others. As a humanizing, educating and refining influence, he believed there was no better society in existence than this would prove. Its foundation would rest upon a religious but undenominational basis. It would include in its membership young and old, rich and poor, Catholics and Protestants, and all could unite in the unselfish and ennobling work of alleviating and removing human and animal suffering. The object of the society would be to prevent rather than to punish. As instances of what might be accomplished, he gave the following examples from the record of the Illinois Humane Association :—"Arrested a man, who was fined $10 and costs and put under bonds of $200 to keep the peace, for extreme and repeated cruelty to a girl in his family, 16 years old. Took the child away from him and placed her in charge of this society." . . . "Arrested a little girl, 14 years old, for obtaining money under false pretences ; had the prosecution dismissed and sent her to the Industrial school for girls at Evanston." . . . "Rescued four little children from a worthless, drunken father and a disreputable mother, and placed them in the St. Joseph orphan asylum." . . . "Took a little girl, who was badly abused, kicked and knocked down and overworked by a cruel, heartless woman, child working like a slave in the kitchen, dirty and ragged, and placed her in the Industrial school for girls." . . . "Arrested a man who was fined $75 and costs for drunkenness and extreme cruelty to his little boy, eight years of age, whom he compelled to sleep out of doors. This society placed the child in the Home for the Friendless." . . . "Arrested a man, who was fined $50 and costs, for stabbing a horse with a knife." . . . "The officers of this society, after a prolonged search, found a little girl of 16 years of age who had been abducted from her home and led astray for immoral purposes, and restored her to her parents. There were three persons connected with the abduction who were arrested by the officers of the society and held to the criminal court and indicted by the grand jury. Still pending."

On motion of Mr. Houston, seconded by Dr. Bryce, it was resolved, "That in the opinion of the Institute the formation in this city of a society for the prevention of cruelty would be conducive to the interests of public morality, and this meeting desires to express its sympathy with the object contemplated."

A communicating respecting "The Elizabeth Thompson Science Fund," was referred to a committee composed of the President, Dr. Ellis, and Prof. R. Ramsay Wright.

FIFTEENTH MEETING.

Fifteenth Meeting, 26th February, 1887, the President in the Chair.

Exchanges since last meeting, 30.

G. M. Rae and T. G. Mason were elected members.

Mr. A. F. Chamberlain, B.A., read a paper on "Pre-historic Ethnology."

He said man probably originated in a continent occupying in former times the ocean south of Africa and Australia. He approximated in physical features to the negro. At a very early date the primitive stock divided into two branches, one with lighter skin and hair less woolly than the other. From the latter of these the surviving negro races have descended; from the former the brown races of Africa, from the parent stem of which have descended the Aryan and Semitic nations, who passed into Europe and Asia respectively from Africa. The Semites are probably less Caucasian in type than the Aryans. The primitive seat of the Aryans before their dispersion was in Europe; The Swiss lake dwellers and the old Pelasgians, who survive in the Albanians of to-day, were descended from the primitive Aryan stock. The Eskimo reached America from Europe, and from their parent stock have descended the Mongol tribes of Asia, with the Japanese and the Chinese. Two points which are of great importance in prehistoric ethnology are the antiquity of man in America and the extensive range of the old Caucasian type in early times. It is well to note that the evidence gained from the study of the languages does not bear out the theory that language originated in monosyllabic roots. The rest of the paper was taken up with the discussion of surviving primitive races, *e. g.*, the Basques, Fulahs, Australians, Ainos and Eskimos, and their bearing on prehistoric ethnology; and with the proofs that archæology and comparative mythology and folk-lore afford of the attainments and culture of primitive man.

Mr. Rouse thought that too high an antiquity had been assumed for the lake dwellings of Europe. He had visited the museums of the lake dwellings at Zurich, and had noticed that a number of the specimens of cereals showed the action of fire. May not this have occurred at the time of the inv sion of Julius Cæsar? as we read in his commentaries that the Helvetians then burned their possessions and abandoned their dwellings.

Mr. Chamberlain replied that lake dwellings were found all over central Europe. No one would imagine that the Helvetii had burned all the lake dwellings in Europe.

Mr. VanderSmissen said that much that related to prehistoric antiquity was purely conjectural. Great care should be exercised in forming opinions on those matters. The same results in different parts of the globe did not prove a similarity of race, or original relationship, but a similarity arising from general principles of human nature.

Mr. H. R. Wood, B.A., read a paper by Prof. T. Nelson Dale, on "The Geology of Mount Greylock," of which the following is an abstract:—

The paper gave a brief review of several months geological field work in Berkshire County, Mass, in the service of the U. S. Geological Survey (Archean Division, in charge of Prof. Raphael Pumpelly, of Newport, R.I.). After a few remarks on the general aim of the U. S. Geological Survey, the topographical basis of its work in Massachusetts, and an explanation of the method pursued in the summer's work on Greylock, the general lithological and structural character of the mountain was outlined, and some of the difficulties which beset the geologist in a highly metamorphic region were dwelt upon in detail. The paper closed with a brief allusion to the various industries, occupations and characteristics of the inhabitants of the region described.

SIXTEENTH MEETING.

Sixteenth Meeting, 5th March, 1887, the President in the Chair.

Exchanges since last meeting, 29.

Mr. John Phillips read a paper on "The Centrifugal Forces of the Planets."

Mr. J. A. Livingston read a paper entitled "Notes on Astronomy."

SEVENTEENTH MEETING.

Seventeenth Meeting, 12th March, 1887, Dr. George Kennedy in the Chair.

Exchanges since last meeting, 35.

The Council announced the formation of a Philological Section, which was approved on motion by Mr. Marling, seconded by Mr. Williams.

The Council announced the election of the following as associates: U. T. Phillips, Thomas Stevenson, J. C. Maybee, G. F. Timms.

Wm. Campbell and W. R. Strickland were elected members.

Mr. A. B. McCallum, B.A., read a paper on "Some Pathological Growths in Lower Animals."

Mr. Macallum exhibited a number of cat-fish affected with cancer in various stages.

In answer to questions from Mr. Livingston and Mr. Rouse, as to whether there was any danger in eating the fish so affected,

Mr. Macallum replied that he did not think there would be any danger at all.

Mr. Macdougall called attention to the salmon disease, or *Saprolegnia*, which affects not only salmon but perch and eels. He had noticed the perch with large holes cut out of the body, jump out of the water as if in pain. The internal organs and the flesh were perfectly sound, and people ate of them without injury. The disease seemed to be the same as the cancer in the fish exhibited by Mr. Macallum.

Mr. Macallum said that the disease attacked all fish that were not in a normal condition. To prevent it a normal amount of food and aerated water were necessary. The sewage in water in the old country caused it.

Dr. Kennedy referred to the number of dead fish sometimes seen floating in the bay, and asked the cause of it.

Mr. Macallum said it was the inability to procure suitable food. They stood the first season very well, but could not procure food the second. There were no parasites in them, they were in a perfectly normal condition.

Mr. Brodie asked the difference between pathological and normal growths.

Mr. Macallum could not, he said, tell which was pathological and which was normal, until all the conditions were understood.

PROCEEDINGS
OF
THE CANADIAN INSTITUTE,
SESSION 1886-87.

EIGHTEENTH MEETING.

Eighteenth Meeting, 19th March, 1887, the President in the chair.

Exchanges since last meeting, 33.

The following were appointed auditors for the year:—D. B. Dick by the President, and T. B. Browning by the members.

The following were elected members:—Frank Rolph, Jos. Kilgour, R. T. Blatchford.

Rev. Father Laboureau, of Penetanguishene, read a paper entitled "Reminiscences of the Huron Missions." He also presented to the Institute a photograph of a letter by Father Chaumonot, Missionary to the Hurons, written on birch bark, and dated "Ste Marie des Hurons, 1645," the original being in the possession of a gentleman of Dijon, France; a brass ring found near the supposed site of the Huron town of Ossossane; and a tomahawk taken from the ruins of the French Fort of Ste. Marie; for which a vote of thanks was passed.

Dr. P. H. Bryce read a paper on "Diphtheria and Scarlatina in their various aspects."

After some discussion,

On motion by Mr. Marling, seconded by Mr. Creelman, it was resolved, "That the Council of the Institute be requested to make such representations to the City Council on the subject under discussion as they may think fit."

NINETEENTH MEETING.

Nineteenth Meeting, 26th March, 1887, the President in the chair.

Exchanges since last meeting, 38.

Charles Potter and M. O'Connor were elected members.

Prof. J. Hoyes Panton, M.A., read a paper on "Places of Geological Interest near Medicine Hat," illustrated by diagrams and Geological specimens.

MR. PRESIDENT AND GENTLEMEN :—To-night, I purpose taking you with me in imagination, to the banks of the majestic Saskatchewan, that wooer of many a stream in the North-west; there we shall examine some places of geological interest, and glean something from the fragmentary records, as we find them at that place and in some ravines of more than passing interest not far from that locality.

Before directing your attention to the places under consideration, allow me, in a few words, to outline the striking geological characters of that vast stretch of country extending from the Western Boundary of Ontario to the Rocky Mountains.

The geology of the great North-west, like its vast plains and immense rivers, is on a magnificent scale. To the eye of the geologist, a grand vision appears, as he contemplates the marvellous panorama, that rolls before him, portraying the geological features of the country lying between the Laurentian rocks to the east, and the lofty mountains of the west; the former, representatives of the first rocks to triumph over the universal waters of primeval days, the latter belonging to a period comparatively near the summit of the geological series. Between these great natural boundaries we see stretching before us, the three vast prairie steppes of the North-west, rising in succession above each other and distinguished by characteristic physical features.

FIRST PRAIRIE STEPPE.

This fertile region well known as the Red River Valley, is about fifty miles wide at the boundary line which separates Canada from the United States, but widens to the north. It has an elevation of 800 feet above sea level and embraces an area of 6,900 square miles. Being the last of that country to emerge from water, it has received the drainage of the North-west for countless years and has thus become enriched by an alluvial deposit of almost inexhaustible fertility.

Some sixty feet beneath the surface solid rock is reached, but in some places, Selkirk, Stony Mountain and Lake Winnipeg, the rock reaches the surface and is usually a magnesian limestone, rich in fossils belonging to the Silurian period.

SECOND PRAIRIE STEPPE.

This is well marked off from the preceding by the Pembina, Riding and Duck Mountains, along its eastern side; it has an elevation of 1,600 feet above the sea, is about 260 miles wide at its southern limit and narrows slightly towards the north. Within this large area, arc 10,500 square miles of land more rolling in character than that of the former district, but also containing extensive stretches of prairie land.

The underlying deposits here differ from those of the Red River Valley, both in character and age. In this area you find Cretaceous clays, some bearing very interesting fossils, while in the preceding, Silurian limestones characterize the deposits.

THIRD PRAIRIE STEPPE.

The so called Dirt Hills indicate the eastern limit of a vast region, some 465 miles wide on the forty-ninth parallel, with an elevation of 3,000 feet above sea level and embracing some 134,000 square miles. In this immense area are located the vast coal fields of the North-west; here too, we find the localities, that are to occupy our attention to-night. The underlying deposits of this region are also Cretaceous. the surface is more rolling than in the other steppes referred to, and in many places lakes and ponds occur with waters strongly alkaline, As this great scene sweeps before us showing in succession these marked natural steps, each full of interest, we can readily perceive what an attractive country the North-west is to a student of geology.

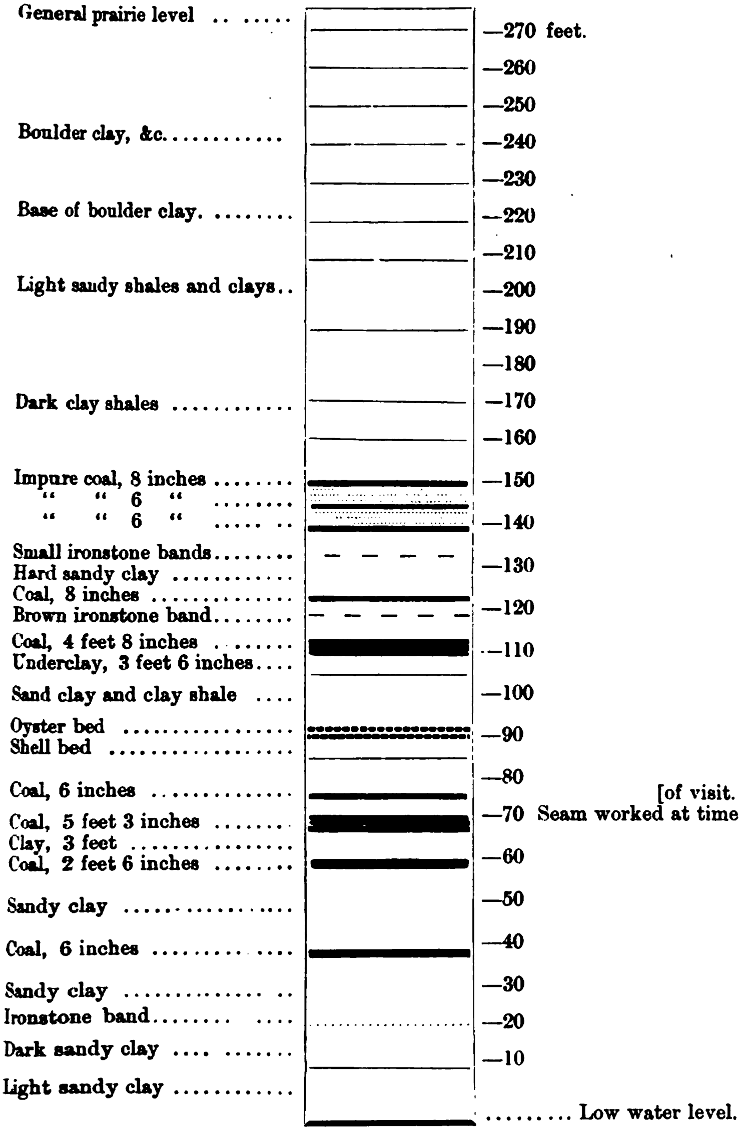
The rich ores of the Laurentian rocks to the east, the level lands of almost exhaustless fertility in the Red River Valley, the rolling districts of the second plateau, with a drier and warmer soil and the third region more vast than the preceding, bearing an inexhaustible store of fuel, all offer attractions to those, who are interested in the development of our great Dominion.

MEDICINE HAT.

This somewhat progressive town is situated 660 miles west of Winnipeg on the banks of the Saskatchewan River over which the Canadian Pacific Railway passes at this place. This is about half-way across the third prairie steppe. Proceeding westward by rail, after a short run of seven miles the station Stair is reached, about one and a half miles from the Coal Mines of that district. As you walk from the station across the prairie, in the direction of the mines, you see no indications of the great ravine, through which the river passes, and from which you are but a short distance. It is only when you come directly upon it, that you see the work nature can perform through the agency of water. As you stand upon the bank of that majestic river, 290 feet above the level of the water and observe, not only the channel worn out by the river, but also the immense lateral excavations made by streams no longer seen, and spring freshets of modern times, you are astounded at the impressive examples of denudation before you.

There being but little solid rock in this region, running water very soon wears immense cuttings through the clays. The coal mine in this vicinity is not located directly on the banks of the river, but on the sides of one of these great ravines leading to it.

The following section of the deposits at this place was prepared by J. P. Lawson, Esq., Manager of the Company mining coal in that district. On the occasion of my two visits to this place I had the pleasure of meeting Mr. Lawson who was very ready to give any information sought.



Section of deposits near Medicine Hat, showing the seam of coal worked by the Saskatchewan Coal Mining Co.

A mine could scarcely be more favorably situated for access than this; the coal comes to the edge of the ravine and has a slight dip to the southeast.

It can either be rolled down to the river's edge, and transported by boat to Medicine Hat, or drawn up an incline to the prairie level and taken by train to points east and west; the latter plan has been followed. During the past year active work in the mines at Lethbridge has affected operations at this place. It is not likely after this that Medicine Hat coal will be used much beyond that locality; for it is found that coal from localities nearer the mountains is superior to that obtained farther east.

Before the opening up of other mines the coal from Medicine Hat was used in considerable quantities in Winnipeg. It is easily kindled, burns with an intense heat and leaves no clinkers. Consumers considered that 1¾ tons were equivalent to 1 ton of anthracite.

The following analysis taken from the report of the Geological Survey gives the composition of this coal.

	Slow coking	Fast coking
Hygroscopic water	16.82	16.82
Volatile combustible matter	29.54	31.90
Fixed carbon	46.34	43.98
Ash	7.30	7.30
	100.00	100.00
Coke per cent	53.64	51.28

Ultimate analysis

Oxygen and nitrogen	17.52
Carbon	54.35
Hydrogen	3.34
Sulphur	.67
Ash	7.30
Hygroscopic water	16.82
	100.00

Calorific power—determined by experiment.

Indicated power of fuel in * calorics	51.44
Indicated evaporative power of water (at 100°c) per pound of fuel.	9.57 pounds

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* A caloric—one grain of water raised through 1°C of temperature.

Specific gravity—1.3972. the weight of a solid cubic foot being 87.32 pounds

The composition of this coal indicates that it is a lignite, showing a considerable proportion of water and ash and a tendency to disintegrate when exposed to the air. A comparison of this coal with that derived from seams nearer, and in the Rocky Mountains, shows the latter to be freer from water, gives less ash and a much higher percentage of carbon, in other words the quality of the coal improves as you approach the mountains. In the iron-stone band near the river several interesting fossil plants were found in the fragments of stone. These are well defined and in many respects can be readily observed to be closely related to the genus Brosenia and the species has been given the name Brosenia antiqua by Sir William Dawson to whom some specimens were shown. These before you were obtained near the river's edge. On account of the gradual slope from the prairie level down the ravine to the river's edge, it is an easy matter to examine the different layers of deposits indicated in the section already referred to. The fossils from the bed almost two hundred feet below the level of the prairie can be readily identified as allied to the oyster family. They are not imbedded in solid rock, but form a layer of loose shells lying between beds of clay; they are exceedingly fragile, usually small and require to be handled very carefully, or they crumble to pieces on examination.

From many gathered, the specimens before you are the only ones, which have remained at all complete.

The presence of oyster shells so far below the prairie level, in a region now removed 2,000 miles from the sea is very suggestive of the wonderful changes which that country has undergone in the ages long receded into the past. At several places along the banks of the river, the remains of petrified trees are very common; some of these belong to types entirely different from those which now grow on the banks of the Saskatchewan.

The clay band 110 feet above the river in some places presents a very attractive appearance, being almost as red as vermilion; a condition which has likely resulted from the burning of coal in the seam below.

This clay seems to have little or no lime or magnesia in it, possesses a fine compact texture and may yet be of economic value as a supply for the manufacture of pottery.

Leaving the mine and passing down the river, the banks do not present the appearance of an escarpment, but immense piles of gravel; these great heaps or hills are covered with grass and the deposits seem to have assumed this condition, long after those seen in the vicinity of the mine. These large mounds of gravel are no doubt comparatively recent in their origin, glacial or post-glacial, while those of the mine are decidedly Cretaceous, belonging to the Belly River series of that system.

IRVINE RAVINE.

Proceeding by rail eastward from Medicine Hat for a distance of 20 miles you reach Irvine station, on the Canadian Pacific Railway. There is very little at this point calculated to prove of interest to a geologist, but on looking to the south, about two miles, in the distance a comparatively high hill appears, with a pecular flat-like summit. This indicates the entrance to a ravine or "Coulee" of more than ordinary attraction. At almost any point it teems with interest to a student of palaeontology; if he desires, and time permits, it can be followed up until the Cypress Hills are reached; a place where during the past few years members of the Geological Survey have made some startling discoveries regarding the extinct fauna of the North-west.

In the Spring of '83, Mr. Lawson, Manager of the Medicine Hat Coal Mine, while prospecting for coal in the region of Irvine, discovered the remains of what appeared to be an animal allied to reptiles

On his return to Winnipeg, he was interviewed by a reporter, and a short notice in the daily papers appeared, describing the pecular remains, found among those lonely hills. In July of the same year, Sir William Dawson, while visiting the North-west heard of this discovery, and set out to find the remains after having obtained directions as to their location from Mr. Lawson; but his efforts were in vain. On his return to Winnipeg, having learned that the writer was preparing to search the same locality in August, he kindly gave the sketch of the locality that he had used, and advised, if possible, to see Mr. Lawson, for he (Sir William Dawson) was under the impression that there was a mistake in the directions given him.

On reaching the Coal Mine in August, I at once communicated to Mr. Lawson the results of Sir William Dawson and asked him to examine carefully the sketch and make any corrections he saw necessary.

Some changes were made and in a few days in company with a gentleman from Medicine Hat, I started with considerable enthusiasm to seek this fossil, around which so much of interest was gathering. It was a very bleak day, when we reached Irvine station and began to wend our way across the flats to the entrance of the ravine. We followed the directions and gradually ascended the hill on the trail, which leads to the Cypress Hills. As soon as the summit was reached, and we beheld the complicated nature of the place, an immense central ravine, and innumerable lateral ones, we began to feel that we had undertaken an almost forlorn hope, in setting out to find a particular spot among such hills. The sketch was frequently consulted, but all was obscure in this wild spot. Among the rugged ravines, we climbed hour after hour, seeking in vain the reptile, that had lain so long among these peculiar hills. Though apparently unsuccessful at first, still much was seen that was exceedingly interesting and instructive. The effect of "weathering" upon the rocks of this place is astonishing. So striking is the result, that my companion frequently observed, "It looks as if some of these hills had been pounded to pieces." Among the debris, we observed numerous crystals of Selenite, which appeared to have been in the upper layers of the clay. Some of these were very perfect and of all sizes and in some parts very numerous indeed. From their occurrence in these argillaceous strata, this mineral seems to have resulted from the decomposition of some iron compound and its reaction on the carbonate of lime in the clays.

Sulphide of iron may have been present and oxidized into the sulphate of the protoxide of iron, which becoming decomposed by the bicarbonate of lime, would give rise to sulphate of lime and carbonate of iron, the former separating out in the form of the crystals already referred to, and the latter remaining as ironstone.

We also found many fragments of large shells resembling the genus Corbula but they all seemed exceedingly fragile and no complete forms were observed. In several parts of the ravine, layers of ironstone intercalcated among the strata of grey sandstone, are of common occurrence and at some points exposures of coal appear, but the seams are comparatively thin, and experience has shown that they are of too irregular a nature to pay to work.

When the hope of finding reptilian remains was beginning to lessen, and my companion becoming disheartened; (for he had come expressly to see the interesting relics of past life,) our energies were revived by finding four fragments of thoroughly petrified bones: these lay on the side of the hill, and appeared as if they had fallen from layers higher up the exposure. Our fallen hopes much revived by this discove y, with renewed vigor we climbed the hill-side, where we expected to find more remains in their original position. Though this seemed on consulting our sketch, to be near the spot we sought, still, we were forced to abandon further search for the reptile, cross over to another part of the ravine and confine our attention to the lofty sides of the escarpment there.

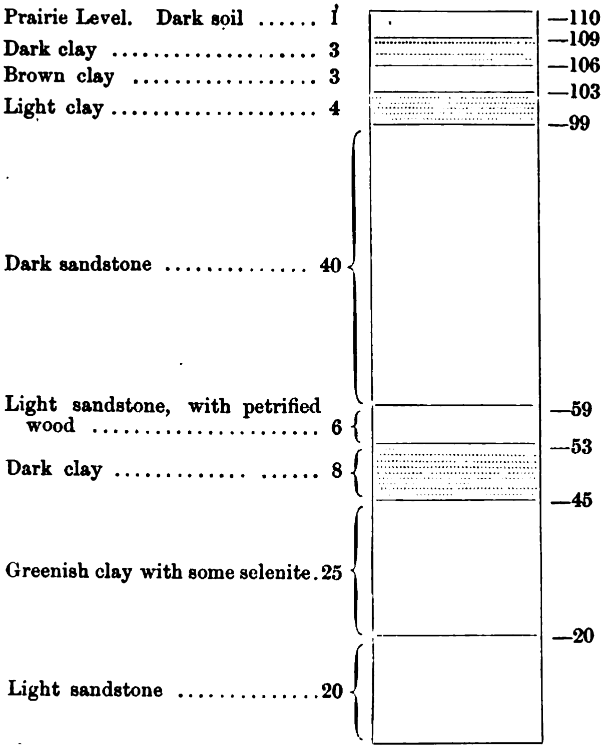
Here a magnificent exposure appeared, largely made up of beautiful sandstone comparatively soft interspersed with bands of stone more or less ferruginous and in some places seams of inferior coal.

The effect of the weather upon this soft sandstone was very marked much of it appeared to have crumbled away leaving shelves of the ironstone, along which we could walk.

In some places the crumbling sand had fallen down the sides and covered over cave-like spaces, into which we sometimes fell, as we walked along the sides of the ravine, the sandy covering, which appeared to bridge over these holes, proving too thin to sustain our weight.

Along the face of this escarpment, and usually near the layers of coal, we saw several bones protruding from the rock, but as often as we attempted to dig them out, all crumbled away except the portion we saw, and which seemed to have hardened by weathering. A visit to the same place the next year and many attempts made to secure fossils from this sandstone, have convinced me that we can obtain only fragmentary fossils at best from this rock; its porous nature allows the water to percolate readily through, and thus affect any bones imbedded in the sandstone. This is a striking contrast to the condition of fossils found in some of the Cretaceous clays of the North-west, where they possess all the lustre and beauty, which characterize some shells of modern seas. On some of the elevated shelves, excellent fragments were found, which the weather, through long periods had prepared. Almost anywhere in this vicinity upon the ironstone bands, fragments of bone could be secured. There was no longer doubt in our minds, that the remains of extinct animals would be found among the deposits of this wild and dreary place, that the bones belonged to creatures of immense size and that they thronged the Cretaceous seas in which these deposits had been formed. We felt amply repaid for all our exertions in this wild, rough and lonely spot, although we found no skull bones or teeth. Some of the bones were very large, apparently portions of thigh bonos and vertebrae; all of which were presented to the Historical and Scientific Society of Winnipeg, with the exception of the specimens placed before you, for examination at the close of the evening's proceedings.

At one place, in particular, where the escarpment was very marked, large quantities of petrified wood lay about at the base and bore a marked resemblance to a pile of ordinary wood, so much so that at first sight, an ordinary observer would naturally consider it such; portions of the trees from which these had been derived could be seen in the sandstone. As this place the strata were so well defined, that a sketch was taken, a vertical section of which may be represented as follows; but it must be remembered, that this is not a uniform condition in the ravine, for the strata vary much in different parts: while a general arrangement may be observed, such as sandstone, ironstone, clay and seams of coal, yet a wonderful difference occurs, when you compare one series of deposits with those in other parts.


Prairie Level. Dark soil 1
Dark clay 3
Brown clay 3
Light clay 4
Dark sandstone 40
Light sandstone, with petrified wood 6
Dark clay 8
Greenish clay with some selenite. 25
Light sandstone 20
—110
—109
—106
—103
—99
—59
—53
—45
—20

On the occasion of a second visit to this place the following year '84, better results followed my investigations. Many fragments of fossil bone were secured but all of little use in identifying the animals to which these remains belonged. However I had the good fortune to discover some teeth. These with some fragments of peculiar bones were forwarded to Prof. Cope, of Philadelphia, who identified the teeth as belonging to a large deinosaur of the genus Lælaps allied to the Megalosaurus, and the peculiar bones as fragments of the carapace of a Cretaceous land turtle of the genus Trionyx.

Portions of other teeth were obtained ; but not complete enough for identification ; in addition to these, a vertebra was found which in all probability belonged to a fish.

The specimens, some of which are on the table for your examination, would seem to indicate that these deposits among the "weathered" hills of this locality are of absording interest to a student of Science. The district is extensive and days could be spent in examining it. Further south beautiful ammonites are readily found, while in the Cypress Hills deposits of a most interesting character occur.

Regarding the geological horizon of the deposits in Irvine Ravine, the subject has received considerable attention by some members of the Geological Survey, who place them in the Cretaceous of which the Belly River series and Pierre Shales are represented in the escarpment near Irvine Station, the Pierre Shales being uppermost and represented by clay banks of a more or less dark color, below follows the Belly River series composed of sandy clays and layers of ironstone nodules among them. The beds are readily acted upon by the weather producing the striking appearance already referred to. Seams of coal appear in these deposits at some places; that mined at Medicine Hat being at the base of the upper division of this series of deposits, while the seam at Irvine Ravine lies at the base of the Pierre Shales. Irvine Ravine thus becomes of more interest than Medicine Hat, the former affording an excellent section in which the Pierre Shales and Belly River series are well illustrated, the latter being largely made up of the Belly River deposits; both groups belong to the Cretaceous system in the geological system.

Having thus directed your attentiou to these attractive geological hunting grounds in the vicinity of Medicine Hat, I shall close this paper with the following diagram which will enable the reader to compare the Cretaceous deposits of the North-west with those of the same system in some parts of the United States and England.

ENGLAND.	MISSOURI.	NORTH-WEST.
Eocene or latest Cretaceous....	Fort Union.	Laramie.
Maestricht	Fox Hill.	Fox Hill.
White Chalk	Pierre.	Pierre.
Chalk Marl......	Niobrara.	Belly River.
Upper Greensand..	Benton.	Benton.
Gault............	Dakota.	Dakota.

TWENTIETH MEETING.

Twentieth Meeting, April 2nd, 1887, the President in the chair.

Exchanges since last meeting, 82.

The Council announced the admission of Ernest M'Craken as an Associate.

A communication was received from the Council recommending the formation of a House Committee, a Museum Committee, and an Archaeological Committee.

The following were elected members:—W. J. Cooper, Geo.

Graham, Robert F. Scott, P. K. Stern, Thomas Pinkney and Thomas McCraken.

Dr. W. B. Nesbitt read a paper on "The Volumetric System in Materia Medica."

In bringing the following paper before you I am conscious of its many imperfections, and that it is not as yet a perfect system, yet I hope you will bear with me, and that in the discussion which I hope it will be its merit to engender, I may receive such hints and criticisms as will enable me to place my system on a still more practicable basis.

The first thing that the student of Materia Medica is struck with, is the almost illimitable number of drugs and preparations, whose number is only comparable with the likewise illimitable and varied doses. It is this heterogenous system of dosage that I would try to place on a more satisfactory basis. We will just glance at a few of the preparations and their doses. We will commence with the inorganic salts. This is what we find :—

Potassic Carbonate	10—30	grs.	Potassic Bromide	5—30	grs.
" Bicarbonate	10—40	"	" Citras	20—60	"
Liquor Potassæ	15–60	"	" Acetas	10—60	"
Potassic Permanganate	1—2	"	" Chloras	10—30	"
" Iodide	2—10	"	" Sulphurate	3— 8	"
" Tartras acid	20—60	"	" Nitras	10—30	"
			" Sulphas	15—60	"

I have chosen the salts of Potash simply because they come first in the book most used by students, *i. e.* Mitchell Brown's Materia Medica. All these preparations when prescribed by the Physician, are first triturated in the mortar for such as are in the form of xtals, and then dissolved in water, water being almost invariably the medium for holding the different drugs in solution, sometimes as in the case of Quinine, a little sulphuric acid is added to assist the dissolving.

Now if these drugs were kept in solution by physicians and pharmacies, and the strength of *each* so graduated that the dose of *all* would be the same, you have the principle of the system. For instance, we will take two or three of the above mentioned salts,

Potassic	Carbonas	10—30 grs.
"	Permang	1— 2 "
"	Iodide	2—10 "

We will keep these on our shelves already dissolved, and we will have the dose for all 1 drm. In order to do this we will make up say one quart, 40 ozs, of each solution. In 40 ozs. there are 320 drms. therefore to have the maximum dose of

Potassic Carbonas in one drm. we must have 320 x 30 or 9600 grs.
" Permang. " " " " " 320 x 2 " 640 "
" Iodide " " " " " 320 x 10 " 3200 "

Now we see by the above, that in 320 drms. of the Pot. Carb. solution we have 9600 grs., or in 1 drm. of solution we have $\frac{9600}{320} = 30$ grs.: in the Pot. Permang., in 320 ozs. we have 640 grs. *i.e.* in 1 drm. we have $\frac{640}{320}$ or 2 grs. which is the requisite dose.

Leaving the inorganic we next come to the organic portion of Materia Medica, this like organic chemistry, has a little more system in it, for we find here the majority of the tinctures have a dose of from 1—2 drms. Still we have such discrepancies as

Tinct. opii	5—40 m.	Tincture opia ammoniata	½—1 drm. m.
" Camp. Co.	15—60 m.	Liquor morphine Hydrochloratis	10—60 m.
Fluid Ext Pilocarpine	10—60 m.	Tinct. Pilocarpine	5—20 m.
Tinct Tolutana	15—30 m.	Tinct. Lobelia	10—30 m.

Also there are the various infusions, decoctions, wines, elixirs and every manner of fluid preparation, with doses varied for each class and the doses for any class varying among themselves.

What possessed the originators of our Pharmacopeia to have the doses so varied, when they might just as well and as easily have had them the same, is to me incomprehensible. The same system and principle will serve here as in the previous instance, by adjusting the amount of the principles taken it would be very easy to have the dose for all ½—1 drm.

In this plan there would also be much less liability to poisoning. The *Modus operandi* of poison cases is as follows: A druggist receives a prescription which calls for Quina Sulph. xxx grs.; now Sulphate of Quinine, as well as the salts of many other alkaloids, have a great resemblance to each other in external appearance, so much so, that the Druggist just looking at the contents, can easily mistake Morphine for Quinine. He gives xxx grs. of Morphine by mistake for Quinine, the man dies; the stomach is sent to Dr. Ellis, and the Druggist appears at the next assizes to answer to the charge of manslaughter. Now, had these been in volumetric solution, with dose for each 1 dr., the Physician would have written Quinine Sulph. 6 drs. and then, as the dose for morphine would been exactly the same, a poisonous quantity would not have been administered.

The above are the principal features of the system, but what would I think still further improve it, would be the introduction of the metric system of measures. The dose for all being the same, there would not be the danger of misplacing decimal points as in the metric system as now applied. Taking for the standard dose 1 to 2 cubic centimetres and having our bottles in sizes of 100 and 200 C. C.'s, there would be much greater facility of reckoning than at present.

By having a uniform dosage system, not only would much unnecessary work for the student be abolished and enable him to devote more of his time to the much more essential study of therapeutics, but for therapeutic purposes we would have a most complete scientific system, as the standard dose ½—1 dr. or 1—2 C.C.'s as the case may be the therapeutic unit, as 1 dr. of tinct. aconite would produce maximum therapeutic effect of the drug, and so likewise the 1 dr. of tinct. opii. the 1 dr. of tinct. digitalis, etc., *ad infinitum.*

Mr. Charles Hill Tout, read a paper on "The Study of Language."

In the May Volume of the Popular Science Monthly of last year, is an article from the pen of Mons. Havelocque in which he puts forth the astounding statement that language is an organism. Now, as this touches upon an extremely important point in linguistics, and is propounded, presumably, in support of the views held by the school Mons. Havelocque represents, it will be well worth while to consider the grounds on which he makes this assertion.

He begins his paper by telling us that the faculty of language stands in close relation with a certain one of the frontal convolutions of the brain which the inferior monkeys do not possess, and which is found in a rudimentary state in the anthropoids, but the full acquisition and most complete development of which has made man what he is—the master of articulate speech—and from this physiological fact alone, he claims a place for that purely conventional medium of thought—language, among the Natural Sciences.

But seemingly conscious of the weakness of this argument, he brings in another by way of strengthening it, viz., in the fact, to use his own words, that no man or group of men is competent arbitrarily to change the structure of its language. The morphological evolution of language defies all convention, all encroachment; it goes on by virtue of its own force, more or less slowly or speedily, but without the fancy or the pleasure of men having any power to divert it from its course. On these two facts, the former at best true only of the *faculty* or *power* of speech, and the latter less than half true, he sweepingly puts aside all objections to his theory and declares that the study of language must be classed among the Natural Sciences. Having got so far he now finds no difficulty in *asserting language* to be an organism. What (he asks in effect) are the characteristics of an organism Formation, growth, development, decay, these are just the characteristics of language; ergo language is an organism. Frivolous as this kind of reasoning may appear it is just what Mons. Havelocque used. Languages, he says arise, are developed, pass on to decadence and perish like other organised beings, and there can be no doubt that language behaves in reality like an organism, and that it is in a constant state of evolution, that is to say, because language has a *birth*, *growth*, *development*, *decadence* and because these are the identical terms used in speaking of the evolution of an organism, terms borrowed indeed from the nomenclature of Physiology, language forsooth must be an organism.

This I contend is the only fair deduction that one can make from his statement. Following on this, he goes on to show the successive evolutions of this new organism, running somewhat superficially through the principal phases of linguistic development. Basing his remarks on the theory proposed by Wm. Schlegel in 1818, viz., that all languages first pass through a monosyllabic period, which the result of later research and study has confirmed and strengthened and which although we are not acquainted with any language in its embryonic or even strictly speaking monosyllabic stage, notwithstanding is undoubtedly the first phase of linguistic life, he tells us that existing monosyllabic languages have greatly improved upon their primitive processes, all of which is incontestably true. The only remark we would offer here is that the term *monosyllabic* when applied as above to *existing* languages should be qualified in some way; as we have *no* example on record of a purely monosyllabic language and that to bring forward the Chinese, as he does, as an example of this class is to talk about a matter we are ignorant of and to put ourselves in conflict with the authority of those whose scholarship in that tongue is beyond dispute. I refer here, in particular, to such men as Prof. Douglas, of British Museum, and Professor of Chinese, at King's College, London, the author of an exceedingly interesting History of the Chinese people, who in this connection states that the Chinese language like most others has suffered loss through phonetic decay. Even at the present day it is as I have shown, he says, less purely a monosyllabic language than has generally been supposed, but in bygone ages there are evidences that it was *poly-syllabic.* We find for instance many words with aspirates in them which point to the loss of a syllable, for example, such a word as K'an leads us to the conclusion that in all probability it was originally Kahan. But there are other combinations of characters which are unmistakably representations of polysyllabic words, and a close examination of any of the dialects shows that these words bear no inconsiderable proportion to the entire number of words. In Pekingese these polysyllabic words are very numerous, partly owing no doubt to the introduction of Manchu and Mongolian words into the vocabulary. But there are also quite enough native polysyllabic words to redeem the spoken language at least from the charge of monosyllabism. A study of a few pages also of Sir Thos. Wade's Tzu Erh Chi is instructive reading on this head. But to return. From this point Mons. Havelocque goes on to show how the agglutinative stage is evolved out of the monosyllabic, but confesses to a difficulty in the evolution of the agglutinative into the flexional or synthetic, and as this has long been felt to be a difficulty we would beg to call attention here to the numerous tongues of the American group or family of languages as offering and affording the very evidence we need to show how the monosyllabic or agglutinative or incorporative may pass into the flexional or synthetic.

Humboldt who first called attention to this family believed that we could clearly discover in them the origin of the tense and mood signs, that is to say, the *process* by which the higher phase is evolved or developed out of the lower; and he cites several good examples in successive stages of transition, for instance, he says that the actual process of transition from the incorporated, the distinguishing feature of the American family, to the inflexional is presented to us in the Mbaya tongue where we find such verbal forms as "*daladi*" which means, thou wilt throw; "*nilabuite*" which means, he has spun, where the *d* is the sign of the *future* and *n* of the *perfect*. At first sight they look like *true* infl xions, but on closer examination we find that *d* is in fact simply a relic of the word "*quide*" meaning, hereafter or later, and *n* stands in the same relation to the word "*quine*" which means, "*and also*" and both have their independent signification at the present time. But it is quite conceivably and highly probable that at no distant date, the independent signification of these abbreviated words will gradually slip, as has actually been the case in the Mexican aud Tamanaca tongues, from the mind of the speaker and be lost and the letters will then become purely formal elements denoting the tense of the verb and nothing more. Indeed some of the American tongues may be said to have already reached the inflexional stage, their primary tenses ending in different letters, for example in the Mexican language there are the terminals "*ya*" or "*a*" in the imperfect and the augment "*o*" in the preterite and others in the future. In the Tamanaca also the present ends in *a*, the preterite in *e*, the future in *c*, and in speaking of these Humboldt says "there is nothing in either of these tongues to show that these tense signs have independent meanings as they once undoubtly had; and there is no reason why they should not be classed with those of the Greek and Sanskrit as true inflexional elements." It is clear then from this that a study of the American tongues is absolutely necessary in order to a right understanding of the process by which the inflexional is developed from a preceding stage and if there were any doubt about this the labors of Dr. Brinton in this field would soon remove it. But as it was not the intention of my paper to demonstrate the processes by which the several phases cf language pass into one another although the subject is a most enticing and attractive one, we will return to the point from which this digression on the sythetic process has led us. What most astonishes us then in reading through Mons. Havelocque's paper is the extraordinary confusion of terms he is guilty of in trying to put the study of language upon the foremost pedestal in the Temple of the Natural Sciences. He distinctly in the earlier part of his paper draws attention to the common habit which confuses the *art* of speech with that of the *faculty* and yet in the same breath uses the two terms interchangeably. We are altogether at a loss to see, unless this is so, why one who speaks at one moment of speech as an *art*—a thing to be acquired—can at the next cull it an *organism*, and this is even more striking when we remember that Mons. Havelocque claims to be treating language exclusively from the scientific point of view. That the *faculty* of speech is in close relation with a certain convolution of the brain no one will dispute I suppose; nay we will go farther and say with him that this same faculty is hereditarily transmitted and goes down with the structure, nature and qualities of the brain, but by what process of reasoning I am to arrive at the conclusion that the *art* of speech, a man made thing, is an organism I am at a loss to conceive. One might as well say that the conventional signs of our methods of recording knowledge, or that the art of painting or sculpture are organisms, all are equally the products of human effort, preseverance and labor. Language is to put it briefly and clearly, simply and purely an instrument for the conveyance of thought, the use of which depends entirely on the skill of him who handles it, in exactly the same manner as the pencil, brush and chisel depend upon the skill of their several users. This seems to me to be so demonstrably obvious and the error and confusion of terms Mons. Havelocque has fallen in to be so plain that it is not worth while to spend more time over it, but go on at once and examine his second argument which because it contains a partial truth may seem for the moment slightly more convincing. Here he says that his *reason* for including the study of language among the Natural Sciences lies in the fact that no man or group of men is competent arbitrarily to change its structure, etc. Here we perceive in a brief glance that the fallacy of his second argument lies in the peculiar and unscientific notion, which he in common with his school holds, concerning the *origin* of language. Though he does not say so in so many words it is abundantly clear from his argument that he pre-supposes man to have started on his career fully equipped with a ready-made and to a certain extent perfect medium for the communication of his wants and thoughts, whereas a study of the phenomena of language on sound inductive principles proves beyond doubt, to use Prof. Whitney's language, that there was a time when man was as destitute of language—*i.e.*, articulate speech as a medium for the communication of his wants and thoughts—as the dog, that is to say, that man, as man, had to acquire by patient and labored effort, a medium of expression in precisely the same way as every child has since, with this important difference, that primitive man had to do it wholly unaided while the child receives the assistance of those around it. The closer one examines the phenomena of speech the more irresistibly is one drawn to this conclusion, a conclusion I may add now held by the majority of the most eminent of modern philologists, and hence in accordance with this supposition Mons. Havelocque most unhesitatingly asserts that language is altogether beyond the control of man or groups of men, whereas experience even within the historical period goes to show that this statement is only partially true, and if we can show the reason why the growth and development of language is, in a measure, outside of the control of man on a more scientific basis than Mons. Havelocque has attempted to do, we shall have taken away the only argument he uses that carries any force with it and this with the light modern research has thrown upon the subject we shall have no difficulty in doing.

In examining the phenomena of language then, one of the most obvious features always confronting us is the different families or groups as we term them into which language is divided, a method of division rapidly growing less fixed and clear, and assuredly pointing to a time when the science shall be a little older and our knowledge of the subject a little more extensive, when we shall be able to trace with comparative clearness all the various existing families or groups to one primitive source. The whole tendency of modern research leading in that direction; and this being so it will then become a comparatively easy task to put one's finger upon the law or force which differentiates the offspring one from another and all from the common parent, and if we turn to the older science of physiology we shall there discover a law or tendency at work which if we borrow and set in motion within the province of language will clearly demonstrate the processes that developed all existing groups of language from one primitive and common source. In citing an example of this law or tendency, to be seen in its operations in physiology it will suffice for us to take the human face. Now it is an incontestable fact that the facial features are greatly influenced by a force at work upon them from the moment of their embryonic existence down to their full development and decay, known as the Law of Conformity to Type. To take the nose for an example we know that in certain families and even peoples this is invariably the most marked and striking feature of the face, and which has been known to persistently run in that family or people for many generations, and when we ask the reason of this phenomenon we are told and we have proved the force of this tendency in many of our domestic animals, of which the pug-dog is a noted instance, that some remote ancestor of this particular family or people possessed a remarkably developed nasal organ, which by the unique force and strength of his character, he conferred in perpetuity so to speak on his favored descendants.

And as it is with the nasal feature so is it with all the others. Now in precisely the same way in primitive times when men were splitting up into families and clans and struggling hard with the difficulties that naturally then in the early stages of language, beset the expression of their wants and thoughts, certain of them stood out like Nimrods above their fellows in mental capacity and power, and so left the impress of their individuality upon their language, giving it just that tendency, setting it just on those lines within that certain groove that would start it on the plane of its development and characterise it through all the phases of its existence.

In the operation of this law of Conformity of Type we maintain that we can discover why we have found it is necessary in the first place to group languages into families; and secondly, and here is our point of divergence from the notion held by Mons Havelocque and his school, that this and this alone, is the reason why language is in a limited sense beyond the direct control or power of man, not because it is an organism given to him in the same way as his nose or his eyes, but rather acquired in the way in which he gets his teeth, if the figure is allowable, by much vexation of spirit, multiplying and developing as do his teeth in corresponding ratio with his needs. Every growth, change and development in speech is due and indeed must be in the first place to an initiatory action of some one individual sanctioned and accepted by his community. Man has absolute power and control over the changes and developments of language, so long as he lets it run on its own peculiar lines. He is powerless only when he would seek to turn the course of its growth and development into some channel other than that it started from and which is invariably laid down and marked out, more often unconsciously than not, while its speakers are uncultivated and in a primitive condition of being. And when it is asked why one language is is superior to another, why one is much better adapted to the uses to which we desire to put if we ask a counter question. Why is the nose of the Jew for instance in general a more striking feature in him than in most other people? And the answer to this question carries by inference the answer to the other, viz., because of some remote ancestor of this people whose individuality and personality of character was so remarkably strong as to leave one of its chief features on all his descendants. Language may be said to resemble organisms in other ways than mere similarity of formation, growth, development, etc. As it is dominated by the law of its type so it is also in much the same way by the law of the Survival of the Fittest. That language which had the good fortune to be sent rolling down the vistas of future ages by a superior master-hand, will by its intrinsic merit and force be best able to adapt itself to all the varying changes of its environment, and will undoubtedly live and flourish while others less favored either remain stunted and deformed, or else drop out of existence altogether.

But while language is dominated by laws identical with some of those running through the Organic Kingdom, and we are obliged for lack of better to fall back upon the nomenclature of physiology to mark its various changes and developments, it is only a warped, prejudiced and unscientific mind that can possibly mistake a mere superficial resemblance for a deep-rooted living reality.

Mr. CHAMBERLAIN referred to the different theories that had been advanced to account for the origin of language. Noiré (whose theory has been partially endorsed by Max Müller) ascribed the origin of roots to the sounds simultaneously used in social acts, as when people work together in digging, threshing, spinning, rowing, &c. These sounds become signs of repeated acts, continuing in the memory as signs of such acts, and so became roots embodying a concept, and being uttered by persons engaged in a common work are understood by all. He (Mr. C.) was of the opinion that language was originally polysyllabic, and was developed according to man's wants. The Chinese was referred to in opposition to this opinion, but this was not a fair example to cite, besides there were indications in Chinese of a polysyllabic structure.

Mr. Tout thought the mistake was in supposing any one theory contained the whole truth. There was no one individual way in which language was formed. He imagined that language was first formed partly dissyllabic and partly syllabic.

TWENTY-FIRST MEETING.

Twenty-First Meeting, April 9th, 1887, the President in the chair.

Dr. Ellis was appointed representative of the Institute at the next meeting in Ottawa of the Royal Society of Canada.

A donation was announced of 83 species of plants, from Mr. G. Montague White.

Exchanges since last meeting, 44.

Mr. Goodwin Gibson was elected a member.

Mr. H. R. Moore, on behalf of Mr. A. C. Lawson, M.A., Geologist to the Geological Survey of Canada, read a paper on

THE DIABASE DYKES OF RAINY LAKE.

The most recent of the crystalline rocks of the Rainy Lake region are comprised in a series of strong dykes of comparatively fresh diabase which are observed to cut, at different localities, the various members of the Archæan complex of formations. These dykes are not infrequent throughout the country lying between the eastern confines of the first prairie steppe, which forms the basin of the Red River of the north, and the western border of the area of Animikie and later formations of the Lake Superior basin. Their occurrence and some of their characters are briefly referred to in my report on the Lake of the Woods region.* As there observed, the occurrence of these dykes cutting the older folded rocks, which in their eastward geographical continuation, pass under the flat-lying Animikie and Keweenawan formations, is suggestive of their possible connection with the bedded traps that form so large a part of the two latter geological series. With the question of the possible identity of character and age of these dykes with the traps of the Animikie or Keweenawan, or of both, is associated the equally interesting one of the extent of the earth's surface, over which, in early geological times, were in simultaneous operation, those particular volcanic forces which appear to have had their focus in the Lake Superior basin.

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*Geological and Natural History Survey of Canada, Annual Report, 1885, p. 41 CC., p. 47 CC.

The more notable field characters of these dykes are : their common strike throughout the region from N.W. and S.E. to N.N.W and S.S.E. ; the sharp, well defined nature of the gash or fissure which they fill, no matter what may be the character of the country rock ; the absence of inclusions of the country rock, or of apophyses of the dyke running into it, except in very occasional instances ; their generally uniform width under different conditions of occurrence in different localities, the limits being as a rule 60 and 150 feet ; their continuity for one or several miles where exposures permit them to be traced ; their passage from a very compact, aphanitic, black rock at the immediate contact with the dyke walls, by insensible gradations to a very coarse-grained, mottled, dark gray rock in the middle of the dyke ; an occasionally observed peculiar pitting of the weathered surface, arranged in straight, more or less uniformly spaced lines transverse to the strike of the dyke ; their prominent, steeply rounded, or domed, glaciated surfaces in contrast to the more gently inclined *roches moutonnées* of the schists and gneisses ; their assumption of brownish tints on surfaces aerially weathered ; (surfaces beneath high water mark of the lakes are generally quite fresh and black).

These dykes have as yet only received a preliminary study, and it will require a much more extended examination of the country in which they occur and a much more elaborate investigation of their petrographical characters before a comprehensive statement of their geological relations can be formulated. A few notes regarding the microscopic features of these dykes, taken together with what has been said of their field occurrence, may however, be of interest, and will serve as a report of progress of what is being done in this line of investigation in the field west of Lake Superior.*

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* These rocks were studied microscopically in the laboratory of the Johns Hopkins University, Baltimore, under the guidance of Prof. G. H. Williams, for whose kind advice and assistance the writer desires to express his grateful acknowledgments.

One of the most characteristic of these dykes is one that traverses the coarse granitoid gneiss of the west arm of Jackfish Lake, which lies to the north-west of Rainy Lake. Its width is 135 feet and its contact with the country rock is well exposed as a sharp line. From a macroscopic examination the gneiss does not appear to have been altered perceptibly towards the contact. Specimens for microscopic examination were taken from different parts of the dyke, viz., at 60 feet, 20 feet, and 6 feet from the contact, and at the contact. At 60 feet from the contact, the rock is a coarse-grained mottled gray rock in which dirty white feldspar and black pyroxene are the prominent constituents. Under the microscope it presents the characters of a coarse-grained, comparatively fresh diabase. Augite of a pale mauve tinted gray colour is abundant and often occurs in masses that fill the field of the microscope when low powers are used. Sometimes these plates of augite are individual crystals. For the most part however, they are not single individuals. When examined between crossed nicols the plate of augite is seen at once to be resolved into an intimately interlocking mosaic of irregularly shaped grains of diverse optical orientation. In ordinary light the boundaries between the different members of these "polysomatic"* masses of augite are traceable only with difficulty and uncertainty. There is no interstitial matter whatever, the different grains being as intimately associated as in the case of interpenetration twins of feldspar. That they are not twins is shown by the fact that there are often as many as half-a-dozen grains all of different orientation thus combined in the same mass. The cleavage, by its lack of continuity over the field of course indicates a difference of orientation in different parts of it, but the cleavage traces are not strongly marked, and attention is only directed to the discordance of the cleavage after the polysomatic character of the mass has been rendered prominent by the analyser of the microscope. This polysomatic structure of augite does not appear to be common. Rosenbusch does not mention it in his last comprehensive summary of the present state of petrographical knowledge.† The nearest approach to this structure that is at all well known is the polysomatic character of some chondri of olivine in certain meteorites such as are figured by Tschermak[‡] and Wadsworth.[§] Olivine in a similar condition in terrestrial rocks has recently been described and figured by Renard in specimens from Kerguelen Island in the Indian Ocean.[||] The polysomatic structure in augite is not so well known. Renard notes that the augites of the feldspathic basalt of Heard Island, Indian Ocean, are grouped together at certain points,[**] and again in the same rocks in Marion Island that the augite is characterized by a tendency to form groups of individuals having their vertical axes parallel.[††] Teall mentions "Granular Aggregates" of augite in the Hett and the High Green dykes in the north of England.[‡‡] Some of these appear from the figures given to be aggregates of grains of augite not in close juxtaposition with an interstitial base, although that figured in Plate XII, Fig. 5, would seem to be a polysomatic augite, and if so is the only strictly parallel instance that I can find of this structure so common in this dyke and in others of the region.

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* Adapted from Tschermak's use of this word as applied to a similar structure in the olivine of certain meteorites.—V. Die Mikr. Beschaff. der meteor. Stuttgart, 1885.

† Mikr. Phys. der Mineralien und Gesteine Stuttgart, 1886.

The augite is generally altered to hornblende at its periphery and occasionally the latter mineral entirely replaces the former. The process of alteration does not appear to proceed along the almost or quite imperceptible lines of demarkation between the different individuals of the polysomatic augite, but extends from the periphery of the mass as a whole in towards its centre.

The plagioclase appears in two general forms, a rather stout or tabular form which is the larger and usually the more cloudy with decomposition products, and a small long lath shaped feldspar which appears quite fresh and in which the polysynthetic lamellae are much more distinct than in the former.

Magnetite occurs in irregularly bounded masses or is disseminated, often quite thickly, through the augite as inclusions of dusty or finely granular aspect. Pyrite also occurs and is discernable macroscopically. Apatite is seen in occasionally colorless hexagonal sections and in slender prisms with rounded terminations. Water-clear quartz, with inclusions of apatite microlites and liquid inclusions with dancing bubbles, forms a considerable proportion of the mineral constituents of the rock and is characterised by having a common orientation for isolated sections over a wide area of the microscopic field. as in the micropegmatite structure. A few colorless garnets are also present. The rock, such being its characters, may be classed as a uralitic quartz diabase.

[‡] Die Mikr. Beschaff. der Meteor. Stuttgart, 1885, Taf. xv. Fig. 1 and 2.

[§] Lithological Studies, Mem. Mus. Comp. Zoöl. Harvard, Vol. x., pl. 1.

[||] Notice sur la geologie de l' île de Kerguelen, Bul. Mus. Roy. Hist. Nat. Belgique, Tome IV. No. 4., p. 233, fig. 1, pl. v.

[**] Notice sur les roches de l' île Heard. Bull. Mus. Roy. Hist. Nat. Belgique, 1886, 8 p. 260.

[††] Notice sur les roches de l' île Marion. Ibid. p. 250.

[‡‡] Petrographical Notes on some north of England Dykes, Q. J. G. S., 1884, 158. p. 229 and 242

At 20 feet from the contact the rock is very similar to that at 60 feet but is much less coarse in texture. It differs from the latter in mineralogical composition in the fact that there is present an abundance of white or colorless garnets, all perfectly isotropic. They have a well defined border indicative of a high index of refraction and a perceptibly rough surface. Their shape is for the most part rounded, or, when rectilinear outlines are observable, they are hexagonal sections of the rhombic dodecahedron. The larger grains have a curved parting which may be demarkation lines between different individuals. The treatment of the slide with hydrochloric acid cold or hot, leaves them unaffected. The occurrence of garnets in basic dykes is by no means unique. They are however regarded as a product of contact metamorphism within the dyke. Speaking of the "Iron District of Lake Superior," Wadsworth says, "Most of the "diorites" (uralitic diabases) here (at Republic Mt.) contain garnets, this mineral being found principally along the edge of the intrusion while the centre was nearly if not entirely free from it. The schist in like manner near the "diorite" frequently contains garnets both rocks appearing to have mutually reacted upon each other." * The garnets in the Jack Fish Lake dyke do not appear to be a product of contact metamorphism since they are found in the middle of the dyke and very much more abundantly at 20 feet from the contact than at 6 feet from it, or immediately at the contact, where their presence has not been detected. Beyond the abundance of garnets, the dyke at 20 feet has the same characters as at 60 feet. The polysomatic structure of the augite is pronounced.

At 6 feet from the contact the rock is fine grained and the ophitic structure of typical diabase is much more characteristically developed than in the coarser grained parts of the dyke. In this part of the

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* Notes on the Geol. of the Iron and Copper Districts of Lake Superior. Bull. Mus. Comp. Zöol. Harvard, 1880, pp. 45, 46, 47.

dyke there is first observed a differentiation of the rock into constituents of different periods of crystalization, the order being first plagioclase in more or less idiomorphic* lath-shaped individuals lying in all positions, then augite generally allotriomorphic,* sometimes hypidiomorphic* and finally a base or matrix of both these minerals in a very much more finely crystalline state together with magnetite. The structure of the base is rather obscure, the chloritic substance usually present in diabase rocks being more prominent here than in the coarser grained part of the dyke when it is almost or perhaps entirely wanting. Quartz is present but in smaller quantities than in the coarser grained portions of the dyke. The augite occurs both in simple individuals and in polysomatic masses. The uralitization of the augite, which is generally observable, is much more pronounced in the irregularly bounded polysomatic masses than in the simple allotriomorphic development of the same mineral. A few garnets are present as inclusions in the feldspar but were not identified with certainty. In this respect this portion of the dyke differs markedly from the more central portions examined. The most interesting constituent of this portion of the dyke remains, however, to be mentioned. It is the non-pleochroic colorless rhombic pyroxene, enstatite; it occurs in idiomorphic development showing the characteristic obtuse domes in some of the sections. It shows regular cleavage parallel to ∞ P (110), upon which the angle of extinction is zero, and characteristic cross parting along which partial alteration of the mineral to bastite or serpentine is apparent. This enstatite is not abundant and plays the role of an accessory mineral. Its occurrence in a rock of well marked diabase structure is interesting. Rosenbusch remarks that it is present in only a few diabases which have a gabbro-like structure,† and Teall has recorded the occurrence of the allied rhombic pyroxene bronzite in the Whin-Sill of the north of England as an accessory.‡ Enstatite also occurs in a variety of the allied rock diabase porphyrite from Schaumberge, which has been described by Laspeyres and Streng under the name Palatinite. This enstatite was not observed in the coarser parts of the dyke but occurs, as will be noted, in the still finer grained diabase at the contact.

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* Terms introduced by Rosenbusch. Cf. op. cit. p. 11.

† Mik. Phys. der Massigen Gestine, 2nd Ed., 1886, p. 188.

‡ Q. J. G. S., 1884, p. 652.

At the immediate contact the dyke assumes microscopically the characters of a very compact grayish black aphanitic rock in which can be occasionally detected minute glistening facets of porphyritic crystals. With low powers of the microscope the matrix is not resolvable but appears as an uniformly yellowish to greenish gray ground thickly dotted with grains of magnetite. Under the higher powers this is seen to be made up, in addition to magnetite, of a fine felt-work of minute lath-shaped crystals of plagioclase imbedded in hazy, somewhat yellowish green flocculent chlorite substance derived presumably from the alteration of the augite, since that mineral cannot with certainty be identified in the base. The porphyritic character of this part of the dyke is well marked, though the imbedded crystals are small. These are augite in small irregular polysomatic masses, with a hazy margin or fringe of greenish decomposition product, and long lath-shaped plagioclase and occasionally stouter broken fragments. Besides these there are porphyritic crystals of enstatite much more altered and less plentiful than at 6 feet from the contact. Neither quartz nor garnets are observable in the contact rock.

Considering then the dyke with reference to its variation in structure and mineral composition the points of interest to be noted are: The passage of the coarse grained central portions of the dyke to the compact aphanitic rock at the contact; the absence of porphyritic structure in the middle of the dyke as contrasted with the well marked development of the same as the rock becomes finer grained towards the dyke walls; the absence of the characteristic chloritic substance of diabase in the centre of the dyke and its abundance towards the contact; the presence of quartz in greater quantity in the coarse grained middle portions than at the sides; the presence of garnets in the coarsest parts of the dyke, their abundance in the medium grained parts and their rarity or total absence in the neighborhood of the contact; the presence of the rhombic pyroxene enstatite in typical idiomorphic porphyritic crystals in the fine grained parts near the contact and its absence in the coarser central parts; the diminution in size of the porphyritic crystals near the contact in co-extension with the increasing fineness of the ground mass; and finally the " polysomatic " structure common to the augite throughout the dyke.

Three quarters of a mile from the exposure where the specimens whose characters have just been given were collected, there occurs, on the opposite side of the bay in the line of the strike of the dyke, another exposure of the same dyke. On the islands of the bay which lie intermediate between these two localities the outcrop of the dyke is observable, so that there is no doubt of their both being exposures of the same dyke. The rock here was not studied in so great detail as at the last exposure. The specimens taken were of the same grade of coarseness as those taken at 20 feet from the contact on the north side of the bay. The feldspars are more decomposed and the twinning lamellae often obscure, and the small quantity of quartz which is associated with them appears to be of secondary origin; whereas the origin of the quartz noted in the same dyke on the north side of the bay seemed much more problematic. In the latter case the common micropegmatitic character of the quartz and the occurrence in it of needles of apatite, which in no way differ from those in the feldspar, together with the not infrequent occurrence of one individual of apatite partially included in quartz and partially in an adjacent feldspar, would argue for the primary character of the quartz. The augite in the dyke on the south side of the bay resembles that already described occurring both in simple individuals and in polysomatic masses. It is largely altered to uralite. Titanic iron with its alteration product leucoxene shows characteristic barred structure of the cleavage traces parallel to the planes of the rhombohedron. The leucoxene is frequently accompanied by a margin more or less extensive, of secondary brown mica. Apatite is present in comparative abundance. Chlorite occurs in vaguely defined masses and the garnets which, as before, are present, are associated with it.

On the south-east shore of Pipestone Lake about a mile west of Stone-dam Portage occurs another of these dykes cutting transversely schists which have a strike of N.E. to E.N.E. The specimen taken from the middle of the dyke has the characters of an uralitic quartz diabase. The feldspar as a rule is remarkably fresh and occurs in the usual lath-shaped twinned crystals of plagioclase. The crystals are commonly observed to be cracked transversely and the cracks filled with a brownish yellow material which shows aggregate polarization. The augite occurs more commonly in polysomatic masses than in simple individuals. The magnetite is often surrounded by rims of secondary brown mica. The quartz is apparently original and has numerous inclusions of an opaque granular character together with fluid inclusions with dancing bubbles, gas pores with black borders and glass inclusions oval and circular.

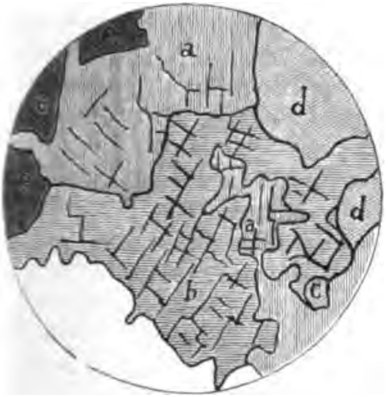

Fig. 1.

Section of diabase, from Pipestone Lake dyke, showing large polysomatic grain of augite in three granules of diverse orientation *a b c* ; *d* uralitic hornblende ; *e* magnetite. X 28.

On the south shore of the North-west Bay of Rainy Lake, a similar dyke cuts both the biotite gneiss of the region and the red granite which is intrusive through it. It is an uralitic quartz diabase. The feldspar is in rather stout crystals in the coarser grained part of the dyke, though usually lath-shaped. It is much decomposed and is partially replaced by quartz and chlorite. The polysomatic character of the augite is not prominent but this may be due to the fact that it is about half altered to hornblende and to chlorite. The augite individuals are often twinned and the cleavage traces are unusually well defined. The magnetite shows a tendency to peripheral arrangement around the altered augite indicative of its secondary origin. Quartz is present which is probably original besides that which is clearly secondary. Apatite in long slender needles and leucoxene in irregular masses, are the accessory constituents.

In the same dyke, nearer the contact where the texture is fine grained, the rock is much more uralitized, traces of augite being observable only in cores of the compact green hornblende, which has almost entirely replaced it. Apatite appears more abundant, as do also the secondary quartz and chlorite. Garnet of a pale yellowish color occurs sparingly.

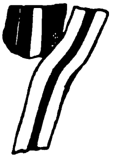

Fig. 2.
Plagioclase fr'm diabase dyke, Northwest Bay, Rainy Lake, sh'wing effect of pressure of one crystal against another.

At the contact the dyke rock is a compact aphanitic base in which can be detected minute porphyritic crystals. Under the microscope the base is seen to be made up of minute lath-shaped crystals of fresh plagioclase augite grains, magnetite and chloritic substance. The porphyritic crystals are lath-shaped feldspars occasionally broken and showing the lamellae in some instance bent, as the result of pressure of one individual against an angular part of another, and augite generally surrounded with an irregular border of secondary hornblende, which, in turn, has an outer girdle or wreath of granules of magnetite that have separated out in the process of uralitization as in fig. 3.

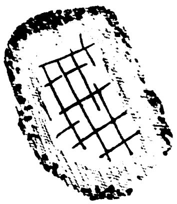

Fig 3.
Augite from diabase dyke, Northwest Bay, Rainy Lake, showing marginal alteration to green compact hornblende with an encircling wreath of secondary magnetite.

In the south part of the Rainy Lake and on the Rainy River a number of these dykes have been observed. One cuts the coarse granitoid gneiss of the river between Couchiching and Fort Frances on the south side of the river, and another crosses the river at the Manitou rapids. Neither of these have yet been examined microscopically. On the lake near the extremity of Gash Point one of these dykes cuts the schists with a strike of N. W. and S. E. across the whole breadth of the point and traverses the islands on both sides of it. Here it is traceable on the point and on the islands for a distance of a mile. Three miles to the south east in the line of the strike of the dyke, a dyke occurs cutting the schists on the islands off the south shore of the lake which is probably a continuation of that of Gash Point. From this point it is traceable for two miles across the islands to the main shore on the south side of Grassy Narrows. Thus, this dyke has a length of at least six miles and has an extension to the north-west and south-east of the points observed, for a distance that is probably very much greater. A specimen from the central part of this dyke, proved on examination to have the characters of a uralitic quartz diabase. The plagioclase occurs in long, rather stout, lath-shaped crystals, which are generally so cloudy as to obliterate the twinning in most cases. The augite occurs both in simple individuals and in polysomatic masses. It exhibits the usual marginal alteration to hornblende and there is besides a certain amount of chlorite. Original magnetite is frequently surrounded by a margin of secondary biotite. Micropegmatitic quartz is abundant. It is often intimately intergrown with the feldspar, and as the latter is much decomposed, would seem to replace it as a partial pseudomorph, but apatite needles of the same aspect as those which occur as inclusions in feldspar, augite, and quartz, are often seen to be inclosed partly in a feldspar and partly in quartz grain. The primary origin of the quartz in spite of its micropegmatitic character, is however, not beyond doubt. It is to be noted that were the quartz original we would hardly expect to find it in such close association with the feldspar. The plagioclase of these rocks affords unmistakable evidence in its idiomorphic character of its having first crystallized from the magma. The augite crystallized next, enclosing the lath-shaped plagioclase; and the quartz, which would be the last to crystallise, we would expect to find separate from the plagioclase by the augite, *i.e.*, to fill in the interstices between the augite. Again although single apatites are often found extending from a quartz grain to a feldspar grain, a condition of things favoring the notion of a common primary origin of both the latter minerals, yet such a phenomenon is not incompatable with a secondary origin for the quartz, since the replacement of feldspar by quartz must necessarily be a slow operation and proceed particle by particle. Further, if the quartz were original we should hardly expect to find in it inclusions of crystals of the first generation like apatite, which would be liable to be enclosed for the most part in the earlier secretions like feldspar and augite, rather than in the residual silica of the magma. The non-existence, however, of quartz in some diabases which are very much decomposed and its presence in fresh ones, militates against the theory of the secondary origin of the quartz in these rocks, so that the question of how much of the quartz is primary and how much secondary in an old diabase is a

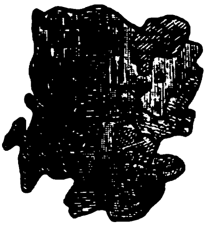

Fig. 4.

Polysomatic grain of augite—Grassy Narrows dyke Rainy Lake, *a* and *b* are twins—the other granules are of diverse optical orientation. X 28.

question that as yet does not appear susceptible of definite settlement.

About a mile to the west of this dyke where it crosses Grassy Narrows Island is another nearly parallel dyke converging on the former at a small angle towards the south. The rock is an uralitic quartz diabase and in its coarser portions, near the middle, the texture is more granular than that of typical diabase. The plagioclase is cloudy with decomposition products and quartz is abundant. The augite is entirely replaced by compact green hornblende the only indication of the augite that remains being the light colored character of the central portion of the hornblende and the abundance of magnetite granules that have separated out in the process of alteration. Apatite occurs in slender hexagonal needles mostly in the quartz, but also in the feldspar and hornblende; and a number were observed which were common to both feldspar and quartz. A few zircons showing parallel extinction, deep black border and brilliant polarization colors also occur. A few colorless, rounded, isotropic grains probably garnets were observed. Nearer the contact where the rock is much finer grained the typical diabase structure is much better developed, the feldspar having its usual lath-shaped character with augite in allotriomorphic structure around it, although the character of the latter is obscured by its extensive alteration into hornblende. The augite so far as it is revealed in the cores of the hornblende occurs both in simple individuals and in polysomatic masses and it is interesting to note that the hornblende derived from a polysomatic aggregate of augite is of uniform orientation throughout. Magnetite or titanic iron with associated leucoxene is generally distributed. The quartz is in small grains proportioned to the finer grained texture of the rock. In the central part of the dyke the quartz is in large grains commensurate with the increased size of the feldspar and augite. In neither case does it occur in the mosaics which are so characteristic of the secondary or vein quartz. In addition to the minerals enumerated in this part of the dyke, there is in prominent porphyritic development an altered rhombic pyroxene. The alteration has proceeded very far and the mineral is now represented only by a mass of yellowish green serpentine with perhaps some of the intermediate alteration product bastite. The cleavage is, however, well defined and the extinction in the several cases noted is sharply parallel to it. These characters together with the traces of the obtuse dome so characteristic of sections of enstatite are sufficient to identify it as that mineral in an altered state. The occurrence of the enstatite in this dyke in its finer grained parts towards the contact is analogous to, and an interesting confirmation of the similar occurrence of the mineral noted in the Jack Fish Lake dyke also in the vicinity of its contact.

To summarise, the main points of interest are, briefly: 1. Post Archæan age of dykes. 2. Their problematic relationship to traps of Animikie and Keeweenawan. 3. Their uniform strike and width. 4. Sharp contact. 5. Passage from coarse texture at centre to aphanitic at sides. 6. Granular character towards centre, porphyritic at sides. 7. Prevalence of quartz and garnets towards centre and absence near contact. 8. Presence of enstatite at sides, absence towards centre. 9. "Chloritic substance" abundant at sides, absent towards centre. 10. Polysomatic character of augite throughout. 11. Uralitization of augite. 12. Very marked contrast of texture of two different parts of a rock mass which solidified under practically the *same pressure* but at *different rates of cooling.*

Mr. James T. B. Ives, F.G.S., read a paper on "Iron and the other Ores of Ontario."

The Secretary of the Bureau of Industries, Ontario, Mr. Archibald Blue, in applying himself to the task of compiling a report of the mines for the year 1884, wrote: "the only records we have for the whole province are those of the censuses taken by the Federal Government, for the first time in 1871 and again in 1881." "These," he adds, "are very meagre, for the only information they give, relates to the quantity of raw mineral products for the year preceding the one in which the enumeration is made." The opening words of that report are: "A country so rich in mineral resources as Ontario should be able to exhibit a good record of operations from year to year." However, Mr. Blue succeeded in compiling a report in which fourteen iron mines are noticed; and the following year, 1885, some others were reported upon by the same official writer. Those notices include statements as to the depth and underground extension of the workings the quantity of ore obtained, the number of men employed and in several cases analyses of the ore. Moreover, it is stated in nearly every case whether the ore is Hematite or Magnetite. These reports of the Ontario Bureau of Industries are the fullest account we have of the mines of the Province.

Next to these ranks the report issued in 1882 by the Department of Agriculture, Ottawa, on the mineral resources of the Dominion, in which each province is treated separately in reference to its own minerals. In that report about twenty localities in Ontario are mentioned, where iron was then being, or had previously been worked.

I only find five mines of iron ore mentioned in the Geological Survey Reports. A catalogue was, however, compiled last year of the minerals exhibited at the Colonial Exhibition, and the iron ores included in that list represent about a dozen different mines.

In Professor Chapman's Outline of the Geology of Canada, describing the Laurentian formation, he states that it contains "beds of magnetic and specular iron ore." In reference to the Gananoque and Northern Townships District he says: "Although not favourably adapted, as a rule for agricultural occupation, the district contains valuable economic minerals. The principal of these comprise: The iron ores of McNabb, Bedford, Crosby, Sherbrook, Madoc, Marmora, Belmont, Limerick, Minden, Snowdon." Again, describing the Huronian strata in the region of the Upper Lakes, enumerating their more important economic minerals, the same author mentions "the iron ores of Echo Lake, Michipicoten River, Pic River, etc."

Of course the notices of one writer often refer to the same mines as those of another. I have, however, jotted down the localities on the map now exhibited and find that the total number of mines recorded is thirty, as follows:—In the County of Haliburton, Lutterworth, Minden, Glamorgan and Snowdon; in Peterborough, Galway, Silver Lake, Balsam Lake, Blairton, Marmora; in Victoria, Digby; in Hastings, Wollaston, Madoc, Tudor; in Renfrew, Bagot, McNab; in Lanark, Darling, Lavant, Sherbrooke, Bathurst, Perth; in Frontenac, Palmerston, Bedford; in Northumberland, Seymour; in Algoma, Bruce Mines; also bog iron at Sarnia and Normandale. The map I have colored to represent the various formations of the Cambro-Silurian, Silurian, and Devonian systems, which overlie the Archean rocks of this area. My object in doing so is this: I wish to show that all these iron deposits appear to occur in the Archean rocks, with the exception of two localities, where bog iron occurs, which is not a deposit in the same sense. In a paper on the economic minerals of Canada, which Mr. W. Hamilton Merritt, M.E., F.G.S., read before the British Association at their Montreal meeting in 1884, he enumerated the localities in which the various ores occurred, and the Geological formations in which they were found. In reference to the iron of Ontario, he stated that in the Lake Superior District it occurred in one instance in the Devonian, and that in the Lake Ontario and St. Lawrence District it occurred in four cases in the Silurian. These particulars he subsequently stated he had obtained from a mineral map of the Dominion displayed at the Paris Exhibition of 1878. That map is not published and in the absence of it I find no evidence of the existence of Devonian strata on the Canadian side of Lake Superior, and the apparent occurrence of iron in the Silurian rocks of the eastern part of the province may perhaps be explained away. I think it will be found that the iron deposits proper are all pre-Silurian.

The Geology of my map is based on the very small map published by Sir William Logan in 1866, to illustrate the Geology of Canada, and revised by the present director, Dr. Selwyn for the Dominion Atlas in 1876.

According to that map it appears that the mines at Blairton and Seymour, and also that at Gros Cap on Lake Superior occur in, or are overlaid by Silurian strata. Unless, indeed, and it is a perfectly legitimate alternative, there be at the points where those mines occur *inliers* of the Archean rocks. This is, of course, a matter of observation in the field. In the case of Blairton and Seymour it is the more probable as those localities appear by the map to lie within the valley of the River Trent, whilst the Gros Cap Mine occurs so near the outcrop of the Archean rocks that it is probable the ore is obtained therefrom.*

How meagre do these references seem when one thinks of the beautiful and voluminous census returns and monographs devoted to the Geology of the same formations on the opposite shores of our own lakes! Or, without soaring to the Monographs of the United

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*Although engaged during the whole of the summer months in exploring geologically the Huronian and Laurentian regions lying between those extremes the author did not visit either Blairton or Gros Cap and cannot therefore speak from personal observation, but is satisfied from analogy that his conclusion is correct.

States Survey, if we compare the fragmentary information we possess in reference to the economic resources of this Province with such complete and practical publications as the annual report of the Mineral Statistics of the State of Michigan, a convenient, portable volume full of information and profusely illustrated with actual sections of the mines, we cannot but sigh for the *good time coming.* As a new comer desirous of informing myself as to the geology of the Province in which I reside I look, anomalous as it may seem, to the publications of our neighbors having reference to the formations of the adjacent states for instruction, for on this side it is not to be found. British soil may be separated politically from that of the United States, but the Archean and Silurian rocks are older than the Declaration of Independence, and the laws by which they are governed do not recognize the boundary.

In view of the undeveloped mineral wealth of the country and the necessity for securing information and preventing the loss of that which is often obtained at great cost to individuals or communities. how important it is that records should be preserved! On this point abundant testimony was afforded by men of science and experts of the highest standing in their evidence before a select committee of the House of Commons at Ottawa in 1884.

Dr. George M. Dawson, D.S., A.R.S.M., F.G.S., one of the Assistant Directors said: "The difficulty in the way is, that the mines of the various provinces are under the control of the provinces themselves, and, consequently, in some provinces there are departments of mines, Nova Scotia and British Columbia, I think, are the only two, and those departments collect for their own provinces all the mineral statistics, probably as fully as necessary, and they have the authority to do so. In the other provinces, there is no authority to collect statistics, and if they are collected by the Geological Survey, they must be collected as a matter of favor from the owners of mines, and that takes a good deal of trouble, and in some cases actual personal visits, as it is not possible to accept a report without some supervision."

Dr. Robert Bell, C.E., M.D., LL.D., one of the Assistant Directors, stated that an attempt was made in 1870 to collect statistics by means of a circular addressed to mine owners or managers, accompanied by a blank schedule to be filled up. When the survey abandoned the attempt, he continued it privately, a conclusive way of proving how important he thought it. He found that the only way to secure the information was to interview the parties personally.

Dr. T. Sterry Hunt, F.R.S., etc., etc., formerly President of the Institute of Mining Engineers of the United States and of the Chemical Society of the United States, speaking of the position of things eighteen years ago, stated: "The work of the Survey was, in the first place, to determine the geological relations of coal, iron and copper deposits, and around them the stratigraphical geology of the country grew up. There were special memoirs prepared on the questions relating to the metallurgy of iron and steel, and these were published in the reports of the Survey; these were of value to Canada in utilizing the iron of the country."

He explained that in Great Britain the collection of mineral statistics is under the control of the Home Office, having until recent years been in the hands of a keeper of Mining Records, Mr. Robert Hunt, F.R.S., who undertook to get mining statistics as volunteer contributions. In France, he stated all these economic questions came in the front rank, there being a regular corps of mining engineers, part of the civil service, to inspect mining districts and keep the public informed. They visit and report upon the mineral resources of other countries, and have published valuable memoirs respecting Canada. But the State surveys of Ohio, Alabama, Kentucky, Pennsylvania, and New Jersey were those which Dr. Hunt thought should afford models to the Dominion. He stated that Pennsylvania had of late years been expending "about $50,000 annually, in a careful survey of all the points relating to the distribution of its rocks, and the geological relation of its iron deposits, of its salt and petroleum, and of the bituminous and anthracite coal, the results of which have been published in small volumes at the cost of paper and printing. Each mineral is dealt with in a separate volume."

Mr. R. W. Henneker, D.C.L., Commissioner of the British American Land Company and President of the Eastern Townships Bank, urged the desirability of securing careful and trustworthy statistics, which "would do an enormous amount of good to the country, as it is hard to find out from private sources any information of this kind."

Mr. William McIntosh said, "That it would be of the greatest advantage to practical miners like himself, to get a report of what had been done in each of the mines, and that it would be just the thing to induce capitalists to invest their money."

Professor Chapman said: "People even come to me from the States and say, Where can I find a Geological report and map of such a district? I am obliged to say that it cannot be found, except in detached portions." He considered that small maps should be published, accompanied by plain reports explanatory of the map and giving lists of economic minerals, with their analyses, current values, etc., accompanied if possible by a few plates, showing commonly occurring distinctive fossils.

Mr. Raphael Pumpelly, Director of the Northern Trans-Continental Survey, Newport, R. I., recommended the collection of such statistics, and considered that the "work should begin with a thorough canvas, similar to the one carried on for the tenth census of the United States, that is, every known locality containing mineral of economic value, whether worked or not, should be visited, and commercial samples taken of its products and these samples should then be subjected to the processes of testing or analysis, according to the requirements of the case. At the same time the statistics of production where workings exist, should be a part of the work."

Professor Dana, the author of the well-known Manuals of Geology and Mineralogy, wrote that he believed "it to be very desirable that mineral statistics should be collected and preserved under government direction."

"This work," said he, "does not necessarily come within the duties of a State Geologist. But it could be connected with a survey, provided it be entrusted to a separate agent, who should make it his special business. Such information is often collected with difficulty on account of the unwillingness of owners to make known the state of their affairs, and it is in danger of being largely erroneous, as a consequence of interested misrepresentations, the fluctuations in the conditions of mines, and the uncertainties of ordinary methods of obtaining values, or estimates of values, by samples. The work, therefore, requires special qualifications, very different from those needed in a geological survey."

I trust I shall be excused for using so largely the words of others, but these testimonies are scattered throughout a long and tedious report, which few are likely ever to read and they appear to me so important that I venture to submit them to your consideration.

Mr. HAMILTON MERRITT said if he understood Mr. Ives aright, he stated that all the iron deposits were archean and none of them Silurian. There was no question, however, that there were large deposits of iron ore in the silurian in the other Provinces. Mr. Merritt then alluded to the difficulty of obtaining information in regard to mines and minerals. It was necessary to travel round the country, and obtain the required information from personal inspection. The importance of collecting this information was recognized by every civilized country, as it was of the greatest value to the projectors, the investor, and the man of science. In England this information was collected under a statute. In the United States it was chiefly collected by the Central Government, though in many of the States there were mining bureaus. It was a matter of great regret that there should be such a great disparity in the amount of capital invested in mines in Canada and the United States. The excess in favor of the latter country was enormous. It was not correct to say as Dr. Selwyn had concluded, that we had not the minerals, as was abundantly proved by the different exhibitions. No country showed a more creditable display of large masses of ore than Canada had done at the late exhibition. Government supervision in the matter was greatly needed. Not merely mining statistics, but every kind of information should be collected that would be useful to persons working in the locality. This valuable information that other countries had seen the necessity of collecting, would give us the same advantages that they enjoy.

Mr. A. BLUE was sure that the views just presented by Mr. Merritt, would commend themselves to the attention of all. Few were aware of the extent and value of the mineral deposits of this Province. He called attention, especially to the petroleum deposits, and the copper mines. He was strongly in favor of steps being taken to collect statistics, and to present the information to the public from year to year.

Mr. SHUTT knew from his own experience that Mr. Miller had collected very much valuable information respecting the phosphates, some of which had been preserved, but much was lost beyond recovery.

Mr. BOYLE asked how the information had been hitherto collected. He did not think that persons owning mines would give the required information, and he did not see how the Government could compel them to give it. He could not see how a law could compel a man to divulge knowledge that would benefit others and injure himself. He thought that other means could be employed to obtain the information required.

Mr. NOTMAN in reference to the discrepancy between the favorable show that Canada had made at the different exhibitions in mineral products, and the little that had been done in developing them, said that it should be recollected that Canada was a young country, and though there was much mineral wealth, there were not the same facilities in working it as in older countries.

Dr. **Hamilton** thought that the Government should make explorations. It would be more useful than collecting mere statistics.

The **President** referred to the number of geological papers read this session, as showing the necessity for the formation of a geological section.

On motion of Mr. W. Hamilton Merritt, seconded by Mr. Charles Armstrong, it was resolved, "That a Committee consisting of the President, Messrs. Notman, Blue, Ives, Wood and the mover, with power to add to their number, be formed, to report at the next meeting of the Institute on the advisability of forming a Geological and Mining Section, that this Committee in view of the facts laid before this meeting, shall take what measures they deem advisable to call the attention of the Dominion Government, or the Government of Ontario, or both of these Governments to the necessity of some improved method of collecting correct returns of mineral statistics, and information regarding mines and mining locations."

Mr. A. B. Macallum presented a paper on "The Origin of Haemoglobin."

TWENTY-SECOND MEETING.

Twenty-Second Meeting, April 16th, 1887, the President in the chair.

Exchanges since last meeting, 41.

The Committee appointed at last meeting presented a report recommending the presentation to the Dominion Government of a memorial regarding the collection and publication of mineral statistics, which was adopted.

The following were elected members :—William Burns, J. Blackstock, B.A.

Dr. A. M. Rosebrugh read a paper on "Photographing the

Living Fundus Oculi," illustrated with diagrams and photographs.

Dr. **Hamilton** referred to accounts of murderers having been taken, and convicted by means of their picture remaining some time in the retina of the murdered man. He had seen this denied. Could Dr. Rosebrugh give any information on the subject?

Dr. **Rosebrugh.**—As to the popular opinion that the image of the last object the person looked at remained in the retina; if an examination were made five or ten minutes after death no image would be seen.

Mr. Boyle read a paper, prepared by Sheriff McKellar, on "A Bragh or Stone Flour Mill," presented to the Institute by the Sheriff.

Mr. Clougher spoke in favor of the establishment of a mining journal.

TWENTY-THIRD MEETING.

Twenty-Third Meeting, April 23rd, 1887, the President in the chair.

Exchanges since last meeting, 26.

The following were elected members:—Thos. R. Clougher, Charles M. Dobson, James Mason, David Spence.

On motion of Mr. Ives, seconded by Mr. Merritt, it was resolved, "That in view of the remarks of Mr. Clougher at the last meeting of the Institute, in reference to the publication of a mining and scientific journal, the Institute do refer the matter to the Geological and Mining Section, with authority to enquire into, and report on a project for the establishment and maintenance of such a journal."

Mr. J. B. Williams read a paper on "Canadian Woodpeckers," illustrated by specimens.

Mr. Dion C. Sullivan, LL.B., read a paper on "Fortuitous Events."

On motion of Mr. Shaw, seconded by the President (Dr. Workman having taken the chair,) it was resolved, "That the Canadian Institute cannot allow this first meeting, since the death of the Rev. John McCaul to pass, without expressing its sorrow at the loss, though in the fullness of years and honours of that eminent scholar and teacher, to whose great abilities and force of character, not only our Provincial University and this Institute, of which he was so bright an ornament, but also the City of Toronto owe so much."

TWENTY-FOURTH MEETING.

Twenty-Fourth Meeting, April 30th, 1887, the President in the chair.

Exchanges since last meeting, 23.

The Council announced the admission of the following as associates:—J. H. Lowe, Wm. Murdoch, S. Beckett.

The following were elected members:—J. C. Forbes, R. Moodie, Alexander Macnabb, Thomas Shortiss, S. Macklem.

Nominations for officers and members of Council for the ensuing year were then made.

Mr. Alfred Baker, M.A., read a paper on "Some Experiments in Connection with the Doctrine of Probabilities."

I. The problems that had been treated experimentally were three in number. The first may be stated thus: A number of equidistant parallel lines are drawn on a plane, and a rod whose length is equal to the distance between two consecutive lines is thrown at random on the plane, to determine the chance of its falling on one of the lines. This chance is readily shewn by the theory to be $\frac{2}{\pi}$ =. ·6366......; *i. e.*, in 10 throws it should cross a line 6 times, in 100 throws 63 times, or in 1,000 throws 636 times, etc. In the experiment a large drawing board had formed the plane, and a fine glass rod had been used. In all, 3,800 throws had been made. Taking any 10 consecutive throws, the widest possible divergences from the 6·366 of theory were observed, the incidents on the ruled lines varying from 3 to 10. The following are numbers selected from ten consecutive decades :

3, 4, 8, 8, 8, 7, 10, 5, 4, 6,
And again, 6, 7, 4, 7, 7, 9, 5, 4, 4, 6,

When any 100 consecutive throws were considered, a much closer relative agreement between experiment and the 63·66 of theory was observed, in the first 1,000 throws the incidences on the ruled lines varying from 59 to 74 ; in the second 1,000 from 59 to 71 ; in the third 1,000 from 55 to 75.

Taking 1,000 consecutive throws, a wonderfully close agreement between experiment and the 636·6 of theory was observed. Thus in the first 1,000 there were 633 incidences on the lines.

And finally for the entire number of throws (3,800) while theory gave 2,419 incidences on the lines, experiment gave 2,423.

II. The second problem was : Two points being taken at random in any triangle : to determine the chance that the line joining them shall cut two particular sides of the triangle. This chance is by the theory shewn to be $\frac{1}{3}$ = ·333......; *i.e.*, in 10 locations of the points, the line should cross the sides 3 times ; in 100 locations 33 times; in 1,000 locations 333 times, etc. For the experiment, a perfectly level triangular board with elevated rim about it had been used. For points, five small shots were placed on the board, so that after each agitation of them (which was effected by means of a whisk) by joining them two at a time, 10 lines were obtained. In all, 1,000 events were produced.

Taking any 10 consecutive events the widest possible divergences from the 3·33.... of theory were observed, the number of times the joining line crossed the sides varying from 0 to 8. The following are numbers selected from 10 consecutive decades :

3, 2, 7, 5, 4, 1, 5, 4, 0, 4.
And again, 4, 3, 8, 4, 2, 5, 2, 2, 2, 4.

Considering 100 consecutive events, a much closer relative agreement between experiment and the 33·33.. of theory was observed, in the 1,000 the intersections varying from 26 to 37.

Taking 1,000 consecutive events, a remarkably close agreement between experiment and the 333.33.... of theory was observed, there being by experiment 332 intersections.

III. The third problem was: Two points are taken at random on a given line of length, a: to determine the chance that the distance between them shall exced a given length c. This chance is by the theory readily shewn to be $\left(\frac{a-c}{a}\right)^2$, *i. e.*, if $a = 00$, we have, according as $c = 25$, 50 or 75,—probability required $= \frac{56\frac{1}{4}}{100}, \frac{25}{100}$ or $\frac{6\frac{1}{4}}{100}$. So that

(1) In 10 trials distance bet. points shd. exceed 25, 5·625 times,
" 100 " " " " " " " 56·25 "
" 1000 " " " " " " " 562·5 "
(2) In 10 " " " " " " 50, 2·5 "
" 100 " " " " " " " 25 "
" 1000 " " " " " " " 250 "
(3) In 10 " " " " " " 75, ·625 times.
" 100 " " " " " " " 6·25 "
" 1000 " " " " " " " 62·5 "

For the experiment a perfectly level rectangular board with an elevated rim about it had been used. Paper divided into 100 equal spaces by lines drawn parallel to two sides of the board, was pasted down on it. Five small shots were placed on the board, so that after each agitation (effected as before) there were furnished 10 sets of two points each, located on a line, which was any line running the length of the board. The ruled lines running across the board assisted in immediately locating the points on such (any) line extending along the board. In all 1000 events were produced.

Taking any 10 consecutive events, the widest possible divergences from the 5·625, 2·5 and ·625 of theory were observed; the number of times the distance between the points exceeded 25, 50 and 75, varying from 0 to 8, 0 to 6 and 0 to 6 respectively. The following are numbers selected from ten consecutive decades:

$c = 25$...... 6, 7, 6, 6, 6, 8, 6, 8, 3, 0.
$c = 50$...... 5, 0, 1, 6, 0, 2, 6, 0, 1, 1.
$c = 75$...... 0, 0, 0, 0, 3, 2, 0, 0, 1, 2.

Considering 100 consecutive events a much closer agreement between experiment and the 56·25, 25 and 6·25 of theory was observed, in the 1000 the number of times the distance exceeded 25, 50 and 75, varying from 55 to 63, from 16 to 33 and from 2 to 10 respectively.

Taking 1000 consecutive events a singularly close agreement between experiment and the 562.5, 250 and 62.5 of theory was observed; there being by experiment 577, 253 and 66 occasions on which the distance between the points exceeded 25, 50 and 75 respectively.

The conclusion so far as these problems were concerned was that the hypothesis on which the theoretical solutions were based was correct; and this hypothesis was that the rod and the points located themselves by chance, that all positions were equally likely, and that in a great number of throws the rod and the points would be equably distributed in various positions. Of course the objects had not located themselves by chance; their every movement was guided and controlled by fixed and definite laws—gravity, resistance of air, friction, elasticity, etc., but no one cause operated to constrain them into constancy of position. We might be disposed to think that where uniform determining cause was absent—where, as we might express it, chance reigned; there would be, when a large number of events occurred, an utter unevenness of distribution, accumulating in heaps at one place and leaving another quite blank. Such, however, had not occurred in these experiments; and with respect to them the assertion could be made that, where complex forces are acting so that determining cause is absent, what might be termed a law of equable distribution held.

Mr. John Notman, Queen's Printer for Ontario, read a paper on "The Manufacture of Paper."

Men have in all ages been proud of their own achievements, while labor, a certain amount of self-conceit and a desire to seek acquaintance with primitive and past events, form the basis of progress and promote civilization.

Men who have recorded their own thoughts and actions, or those of others, are the ones who have exerted the greatest influence for good, or for evil, in all ages.

The hieroglyphic form of description is said to have been used in Egypt as early as the third dynasty, the date of which is placed about 4,000 years B.C. by some chronologists; but the markings and engravings upon rocks have been mostly rubbed out by the hand of time and we have to come down to the times when they wrote or modelled in soft clay and baked it with fire. In that grand storehouse, the British Museum, many such indestructible terra-cotta specimens may be seen from the ruins of Nineveh and Babylon and whose decipherment reveal much concerning Chaldea, Babylonia and Assyria.

There is something about those tablets of clay that forbids any desire on our part to discredit them. They seem to appeal to our practical understanding and the tendency to doubt them is not so strong as with some modern written histories. The word paper is derived from the Greek word "Papyrus" and it was derived from the Egyptian word "Papu" which name was given to a very useful plant belonging to the family of the sedges. It grew, and still grows on the marshy banks of rivers in tropical climes.

The plant has large and abundant rootstocks which spread in the mud and throw up numerous stems from five to ten feet high. The stem is triangular and smooth.

The right of growing and selling the plant was a government monopoly in Egypt. It was used for a great variety of purposes besides paper.

Its graceful plumes, or drooping flower-tufts, crowned the statues of the Gods and decorated their temples; its pith was eaten as food; wicker-work boats, boxes, and baskets were woven of its stalks; while sails, cordage, cloth, mats and sandals for the priests were made of its bark. It was applied as medicine to the cure of ulcers and swellings; it furnished material for torches and candles, while its roots were used for fuel and manufactured into furniture and household utensils.

In making paper the inner cuticle of the stalk was cut into very thin slices. The finest slices were those next to the pith and decreased in quality as they approached the outer integument.

The slices were laid side by side on a smooth flat surface and covered with a second layer placed at right angles to them, after which they were pressed so as to cause the different laminae to adhere to each other and form a single sheet, which was then dried in the sun. The glutinous sticky sap of the material was sufficient to bind and hold the slices together in a firm and compact sheet. In the Roman times, a thin sizing was brushed over the sheets, when they were beaten smooth with a mallet and polished with a piece of ivory or a shell.

Various qualities were manufactured and used as occasion required, from the finest writing to wrapping paper.

In the reign of Claudius, fineness, strength and color were imparted by putting a new layer of the best slices over a sheet of coarser quality. Paper found on mummies recovered from the Pyramids, Egyptian tombs, Catacombs and overwhelmed cities indicate an antiquity of 2,000 years before Christ, and through decipherment of the writings thereon much information has been obtained as to the history, manners, customs and literature of the Egyptians.

Papu, or papyrus, was usually made into rolls fifteen inches in width by one hundred and fifty feet in length, and cut off as required.

In the seventh century the conquest of Egypt by the Saracens put an end to the export of Papyrus, and Western Europe was obliged to supply its place with Parchment and Vellum, until the introduction of paper.

Parchment was in use about 500 years B.C. and about a century B.C. it was the chief material for writing upon, when its use spread all over Europe. Parchments were made of the skins of sheep and goats while Vellum was made of the skins of young calves, kids and lambs.

Animal parchment has been superseded by vegetable parchment, or parchment paper, first known in 1854, which resembles animal parchment so closely that it is not easy to distinguish the difference. It is made by immersing unsized paper in a bath of oil of vitriol, or sulphuric acid. The exactness of the bath and the time of immersion are of the greatest importance to the success of the result and several apparently trifling points must be carefully attended to, or the operation will not succeed. The alteration which takes place in the paper is very remarkable. No chemical change is effected, nor is the weight increased, but a decided molecular change takes place: Insects do not like it, and it is valuable for Land Patents, Deeds, Diplomas and valuable documents deserving preservation.

The Chinese were the first to make paper from vegetable fibres about the beginning of the Christian era.

The Hindoos and Arabs carried the art thence to Spain and from there it found its way to all parts of Europe. Paper made from cotton, dates in Europe, from the tenth century, and from linen, from the thirteenth century, when it took the lead and maintained it to the end of the eighteenth century.

In the establishing of a papermill it is necessary to select a site where water of good quality and in great quantity can be had.

It may also be necessary to construct filter-ponds so as to have plenty of clean water when freshets and heavy rainfalls soil the rivers. Then a solid stone foundation should be built, for the machinery is ponderous and hardworking and the foundation on which the paper machine is to be mounted must be solid and firmly united, so that not the least vibration or change in position of any of its parts can take place.

Timbers that will best withstand the influence of water, such as white oak, or hard yellow pine should be used.

Rubber belting is always preferable to leather as it withstands the influence of water and moisture so certain to be in every papermill.

875 different materials of a vegetable, fibrous and cellulose nature have been worked into paper pulp, but only a few are worthy of special consideration.

Esparto-grass is a spontaneous product of sandy soils, is abundant in Eastern Spain and Northern Africa, makes a beautiful paper and yields 48°/₀ of pulp

Manilla grass is a product of Eastern Asia, is extensively made into ropes and bagging and reaches in due time, like rags, the papermill. It is considered the strongest of all known fibres, and furnishes the well known tan colored wrapping paper. Competition, large demand and skillful manipulation, have produced manilla paper, however, with much straw, old paper, some jute and very little manilla grass in it.

Jute is another East Indian fibre very similar to manilla, is much cheaper and makes a good substitute in appearance, though not nearly so strong.

Cane:—In the Dismal Swamp and along the rivers of North and South Carolina, as well as in the low lands of the Mississippi the country is covered for many miles with the spontaneous growth of a reed or cane. This cane is a hollow tube about twelve feet high, nearly white and apparently composed of tough, strong fibre.

The territory covered with it is so vast and unfit for any other useful growth that the supply of cane seems to be nearly inexhaustible, especially if it is considered that a new crop can be cut every three years. The dried fibres have a strong resemblance to oakum and make a strong spongy paper.

The woods give a good per centage of pulp and are most easily obtained in large quantity.

The per centage of fibre obtained from the woods runs from 26 to 38, the least being from walnut and the greatest from horse-chestnut.

All the grasses are reduced to a very small proportion of their original bulk by the time they leave the pulpmill and nothing but the clean fibres are contained.

Out of 100℔ of flax or hemp, as it comes from the soil, only about two and a half pounds of good white linen can be obtained. Papermakers unanimously agree that "Rags are King" over everything for making the best qualities of paper.

The everchanging prices and demands of the markets, and the difference of raw materials, together with keen competition, tempt the makers to their utmost skill to use inferior stuff for good papers.

The great bulk of the news and cheap bookpapers is now made of woodpulp, and after the dissipating of many supposed and imaginary obstacles as to the propriety of using such paper, it has come to be preferred. Printers' ink is an oily, little fluent substance which does not spread beyond the limits given by the type on any common paper, so that a better impression is made by a fast running printing press on woodpulp paper.

Whatever products are used, the art of paper making consists in the reduction of all into their primitive fibres and forming them into felted sheets, and the less the fibres are cut or broken the stronger and better will the paper be.

There are some 1,500 trade definitions and commercial classifications relating to papers, such as sizes, qualities, materials, clays, chemicals, coloring stuffs, etc., too numerous to be retained in the memory, so that quite a reference pamphlet has to be consulted.

The essayist then gave a minute and detailed description of papermaking by hand; still continued, but mostly due to the conservatism of the people, though good for Bank Notes. He described the production of water marks and showed some beautiful specimens. He explained the disinfecting of rags by a machine which takes in a bale, bores it throughout and disseminates sulphurous acid to a sufficient extent. The rag trade and its tricky dealers. The mill operations in cleaning, sorting, cutting, boiling and bleaching. Before the discovery of chlorine for its powerful bleaching, the color of the rags determined the color of the paper. Rags to be kept dry and in moderate heaps, for fear of spontaneous combustion. Wood is received at the mill as cordwood, is freed from bark and dead-knots and piled up to dry. It is then fed on to a machine which grinds it to dust; or better, which cuts it into small chips; the best is to cut it into blocks, as the fibres are but little broken. The wood is then boiled at a high temperature and with strong chemical agents to soften the wood, toughen the fibres and lessen their adhesion, after which they are soon ground to pulp. The object of boiling all papermaking substances is, to decompose the fatty, glutinous and coloring substances and remove everything but pure fibre.

The alkaline substances used are fresh burned quick-lime or the milk of lime, carbonate of soda and caustic soda.

The boiling is continued for about twelve hours, but ropes and bagging require twice that time.

The materials must then be washed from all impurity, most surely from all traces of chlorine.

They are next put into the Beating-engine and macerated into fibre by knives and friction. Everything to be added to the fibre must be put in here, such as china-clay, sizing or coloring.

Animal sizing is obtained from skins, ligaments, cartilages, tendons, hoofs and ears of animals, steamed and strained until only 5% of matter is left; alum is added to prevent fermentation or decomposition of the gelatine. Paper run through this is known as tubsized paper.

Vegetable sizing is composed of resin, carbonate of soda and alum, this mixture is added to the pulp in the Beating-engine and such paper is known as engine-sized.

There are two degrees, viz. soft-sized and hard-sized and are mostly applied to printing and book papers.

Writing papers are commonly coated with animal size. Papers put through vegetable sizing and then through animal sizing are known as "Double-sized" also as "Hard-sized" which paper has superior hardness, lustre, enamel and smoothness of surface.

The reader detailed the calendering of papers and enumerated quite a variety of papers made for special purposes.

He referred to the great Chicago fire in 1871 when ten thousand houses 16 x 20 feet were built in one day, of paper boards both waterproof and fireproof, and served speedy shelter for thousands of homeless people.

He referred to the different movements of the paper machine and the various improvements made until such perfection has been attained that paper can be made in one continuous web of any length, and before leaving the machine can be made, sized, dried, calendered, hot-pressed and cut into sheets, and at the rate of 125 feet long by 100 inches wide per minute.

At present there are 3,500 papermills in Europe.

The Dominion of Canada occupies but an insignificant position among the paper making countries, while the United States occupies a very high one. Great Britain occupies the highest position and the total production of all the mills there, is not less than 3,500 miles of paper daily.

THIRTY-EIGHTH ANNUAL MEETING.

Thirty-Eighth Annual Meeting, May 7th, 1887, the President in the chair.

Exchanges since last meeting, 33.

The following were elected members :—T. G. Williamson, W. Williamson, W. Canniff, M.D., C. Egerton Ryerson, B.A. George Cox, A. W. Murdoch.

The following reports of sections were read :

1. Philological Section.

1. The first meeting of the Section was held on March 15th, 1887, when the following officers were elected :—Chairman, Rev. J. F. McCurdy, Ph. D. ;

Vice-Chairman, D. R. Keys, B.A. ; Secretary, George E. Shaw, B.A. Committee :—J. Squair, B.A. ; M. L. Rouse, J. H. Cameron, B.A. ; J. Cunningham Dunlop, Ph.D. ; W. H. VanderSmissen, M.A. ; Wm. Houston, M.A.

2. The first two meetings were held on Saturday afternoon, March 5th and March 12th, at 16 o'clock, all the subsequent ones on alternate Mondays, beginning March 28th, 1887.

3. The Section has 18 members.

4. The following papers have been read before the Section :

1. "How we Speak," by A. Hamilton, M.D.

2. "The Science of Language in Popular Education," by Rev. J. F. McCurdy, Ph.D.

3. "Umbrian Inscriptions," by Rev. Neil McNish, B.D., LL.D.

All which is respectfully submitted.

GEO. E. SHAW,
Secretary of Philological Section.

2. Architectural Section.

This section consisting of five regular and nineteen associate members of the Canadian Institute, has held eleven meetings since its formation, of which the following is a list :

Monday, January 10th, 1887, Discussion on "What Style of Architecture is Best Adopted to this Country."

Monday, January 17th, 1887, Discussion on "The Use and Abuse of the Romanesque Style of Architecture."

Monday, January 24th, 1887, Paper on "Foundations," by Henry Steele.

Monday, January 31st, 1887, Lecture on "Wood Floors," by S. G. Curry.

Monday, February 7th, 1887, Paper on "Style," by J. C. Horwood

Monday, February 14th, Lecture on "Columns," by Alan Macdougall.

Monday, February 28th, 1887, Paper on "Hints to Young Architects," by Henry Langley.

Monday, March 7th, 1887, Lecture on "Arches," by W. L. Symons.

Monday, March 14th, 1887, Paper on "The Doric Temple in its Religious and Artistic Aspects," by J. W. Gray.

Monday, March 21st, 1887, Receiving the judge's report on, and describing the competitive drawings.

Monday, March 28th, 1887, Paper on "Masonry," by A. F. Wickson.

J. D. HYNES,
Secretary.

3. Photographic Section.

The first meeting of the Section for the purpose of organization, election of officers, &c., took place on the evening of February 23rd, when the following were elected:—Chairman, H. Neilson; Vice-Chairman, R. Ewing; Secretary-Treasurer, A. Gaunt. Executive Committee—E. R. Parkhurst, W. W. Fox, F. D. Manchee, C. F. Wagner, W. A. Forbes. The number of members now on the roll is 28; associates, 5. Total, 33.

Meetings for the transaction of business, &c., have taken place on the first Tuesday in each month, but so far no papers have been read. The first exhibition of the Section took place in the Library of the Institute, on April 12th and 13th, and was very successful, considering the short time given for the preparation of pictures.

ARTHUR GAUNT, Secretary.

4. Biological Section.

FROM JUNE 1886 TO APRIL 1887.

During this period eighteen meetings of the Section have been held, with an average attendance of 18¾ (say 19) members. The Section has 36 ordinary members and 12 associates. Twelve papers have been read at the meetings, and nine short communications received. Two of the meetings were set apart for microscopical exhibition and discussion under the able conduct and superintendence of Professor Ramsay Wright.

In June a branch of the Audubon Society was organised in connection with this Section, and Mr. Hollingworth was appointed Local Secretary. There are now 106 members in the Toronto Branch.

In October a special vote of thanks was passed to W. H. Doel, J.P. (one of our members,) for his earnest efforts made during the summer, for the protection of insectivorous birds, by fining all violators of the law that were brought before him.

During the same month an offer of the Section to provide the interest for two years on a loan of $1,000, led the Council of the Institute to decide on at once, fitting up the attic of the building as a museum, instead of leasing a part of it to the Art School, and since the completion of the new rooms, the members of the Section have assisted in moving the objects and cases from the various places in which they lay, to the top of the building.

J. B. WILLIAMS,
Secretary of the Biological Section.

5. Geological and Mining Section.

SIR,—I have the honor to report that, proceeding under authority conferred by the Canadian Institute, a meeting of members was held on the 20th of April, ult., when a Geological and Mining Section was duly organised, and that at an adjourned meeting, on 30th April, regulations and by-laws were adopted, which have since been approved by the Council of the Institute, and that the following officers have been elected for the incoming year. W.

Hamilton Merritt, Chairman ; Alexander Macnabb, Vice-Chairman ; Archibald Blue, Secretary ; George T. B. Ives, Assistant Curator. Messrs. Boyle, Dobson, Notman, Phipps and Dr. Bryce, Executive Committee.

The first regular monthly meeting of the Section was held on Thursday evening, 5th inst., at which the Chairman gave his inaugural address. The Section is composed of 15 members.

Your obedient servant,
A. Blue, Secretary.

Alan Macdougall, Esq.,
Secretary Canadian Institute.

The President read the 38th Annual Report.

ANNUAL REPORT OF THE COUNCIL OF THE CANADIAN INSTITUTE.

SESSION 1886-87.

The Council of the Canadian Institute have the honor to lay before the members their thirty-eighth Annual Report.

During the past session twenty-six meetings, including the annual conversazione, have been held, at which forty-nine papers have been read, in addition to twenty-three read at section meetings. This number is largely in excess of that of any previous year in the history of the Institute. The character of these communications is fully equal to the standard of previous years, and the range of subjects (as shown in the appendix) is unprecedently large. The average attendance at the regular weekly meetings also shows a considerable and steady increase.

The distinguishing feature of the year has been the successful establishment of no less than four new sections, in addition to the Biological section, incorporated at the end of last session, viz.: (1) A Photographic section; (2) an Architectural section ; (3) a Philological section and (4) a Geological and Mining section. The creation of these sections has extended the benefits of the Institute to new classes of the citizens, and has been the chief cause of the large increase of membership. Their annual reports, which are appended, show a gratifying spirit of activity in every branch of the Institute.

A further evidence of this increased activity is seen in the number of memorials presented to the Provincial Government, with successfull results in many cases, as follows: In February last the Committee of Ways and Means waited on the Minister of Education and urged him to increase the annual grant to the Institute from $750 to $1,500, for general purposes, and to enable us to give courses of public lectures on scientific subjects, especially in connection with industrial pursuits. While gratefully acknowledging the increase of the grant to $1,000 for general purposes, the Council regrets that the Government did not see fit to comply with the latter part of the application.

In the same month the Archæological Committee urged the Minister to make a yearly grant of $1,500 for Archæological research in Ontario, and the passing of an Act for the protection of Archæological remains founded upon Sir John Lubbock's "Ancient Monuments Act of 1882." The Council again thankfully acknowledge the liberal grant of $1,000 for this purpose, but regret that the heavy work falling upon the Minister this session in connection with educational matters should have made it impossible for him to bring in an Ancient Monuments bill, which would have greatly enhanced the value of the grant. It is hoped, however, that such an Act may become law in the next session of the Legislature.

In March a deputation waited on the Commissioner of Crown Lands to urge the establishment of a large park reserve in the district of Nipissing, for the protection of wild animals and of timber, and were assured of the Minister's sympathy. An Act for this purpose will, it is hoped, be the result of this application in the near future.

In April a Committee urged upon the same Minister the propriety of some improved means of collecting information on matters connected with the mining interests of the Province, and received assurances of co-operation.

Another pleasing feature of this year's work is the partial completion of the Museum of Natural History and Archæology in the third story of our building, which will, it is confidently expected, enable us, for some time at least, to properly accommodate our collections and donations. In this direction the Council desires to acknowledge the liberality of the Biological section in guaranteeing the interest for two years on the $1,000 borrowed for this purpose.

The Library has been increased by the addition of 124 volumes of bound exchanges; but further shelf accommodation is urgently needed.

While congratulating the Institute on the increase in membership, in income and in activity, the Council feel that it is necessary to impress upon the members the fact that the current expenses are greatly increased, especially in printing and gas, while there is a falling off in the rentals; and also that, in order properly to fulfil the objects for which it exists, the further extension of the Museum and Library and the completion of the building by the erection of a commodious lecture hall is highly desirable. They therefore urge upon the members the necessity of supporting the present efforts of the Committee of Ways and Means by every means in their power, by contributions, by presenting the claims of the Institute to the public in every possible way, and by endeavouring to obtain new members.

During the past year the Institute has lost by death one of its most distinguished honorary members, the Rev. John McCaul, LL.D., late President of University College, and President of the Institute from 1862 to 1864. The deceased was for nearly half a century one of the leading figures in social and educational affairs in this city, and his articles on Roman Inscriptions in the *Canadian Journal*, which formed the basis of his great work on that subject, had much to do, not only with the establishment of his own claims to be called the first English scholar in Latin epigraphy, but with the high standing attained in those early years by our journal.

[Signed.] W. H. VANDERSMISSEN,
ALAN MACDOUGALL, *President.*
Secretary.

APPENDIX I.

MEMBERSHIP.

Number of Members April 1st, 1886	233
Withdrawals and deaths during the year	14
	219
Elected during the year	71
Total members April 1st, 1887	290
Composed of :—	
Honorary Members	5
Life Members	13
Ordinary Members	272
Total	290
Associates	30

APPENDIX II.

TREASURER IN ACCOUNT WITH THE CANADIAN INSTITUTE FOR THE YEAR ENDING MARCH 31st, 1887.

To Summary—		
" Balance on hand	$ 63	05
" Annual subscriptions	919	00
" Rents	218	00
" Government Grant	750	00
" Proceeds Wallace Lectures	107	42
" Journals sold	29	29
" Periodicals sold	32	61
" Mr. Sanford Fleming's proportion of printing	62	41
" Interest	2	65
" Natural History Society, balance of funds	8	73
" Subscriptions to bust of Dr. Wilson	25	00
" Proceeds of note discounted	300	00
" Proceeds of Mortgage due 1892	3,000	00
	$5,518	16

By Summary—		
" Salaries	$ 373	50
" Printing Journal	338	76
" " Miscellaneous	7	50
" Binding	124	60
" Stationery	32	89
" Postage	201	95
" Freight and express charges	20	91
" Repairs, stoves	4	30
" Gas	43	12
" Water	24	00
" Show cases for specimens	100	00
" Advertising	3	00
" Periodicals, 1886	120	36
" " 1885	60	55
" Discount on cheque		25
" Consul's certificate and Custom's expenses	3	50
" Sweeping chimneys	2	00
" Fuel	109	90
" Painting	104	13
" Interest	194	39
" Mortgage due August, 1886	3,411	00
Carried forward	$5,280	61

Brought forward		$5,280 61
" Taxes		10 21
" Bust of Dr. Wilson		25 00
" Legal expenses		25 00
" City Directory, 1887		3 00
" Repairs to building		60 47
" Matting for reading room		26 80
" Housekeeper's expenses		10 00
" Journals purchased		50
" D. Boyle, disbursements and expenses		20 17
" Balance, Imperial Bank	$50 00	
" " Cash on hand	6 40	
		56 40
		$5,518 16

Examined and found correct.

(Signed) T. B. BROWNING, } Auditors.
D. B. DICK,

April 22nd, 1887.

BUILDING ACCOUNT.

1886.		
Dec. 1,	To Donation Natural History section	$ 50 00
1887.		
Jan. 8,	" Mortgage due 1892	1,000 00
	" Interest	48
		$1,050 48
1887.		
Feb. 9,	By Law expenses	$ 12 65
	" Carpenters' contract, Certificate No. 1	300 00
Mar. 11,	" " " " No. 2	75 00
	" Balance Imperial Bank	662 83
		$ 1,050 48

Examined and found correct.

(Signed) T. B. BROWNING, } Auditors.
D. B. DICK,

22nd April, 1887.

ASSETS.

Building	$11,500 00
Warehouse	720 00
Ground	3,000 00
Library	5,500 00
Specimens	1,300 00
Personal property	600 00
	$22,620 00

LIABILITIES.

Mortgage, No. 1, due 1892	$ 3,000 00
" No. 2, "	1,000 00
Note discounted	300 00
Balance in favour of the Institute	18,320 00
	$22,620 00

APPENDIX III.

Donations and Exchanges.—Books and pamphlets received from April 1st, 1886, to April 1st, 1887:—From Canada, 190; United States, 398; Great Britain and Ireland, 310; India and Australia, 82; all other countries, 1,250; total, 2,230.

Total number received in 1882-3, 280; ditto. 1883-4, 800; ditto 1884-5, 730; ditto 1885-6, 1,502; ditto 1886-7, 2,230.

APPENDIX IV.

The number of societies and publications with which the Institute exchanges is 341.

APPENDIX V.

To the periodicals subscribed for last year the following have been added:— *English Historical Review*, *Scottish Review*, *Hardwicke's Science—Gossip*, *Science*. There have been discontinued:—*British Quarterly Review*, *Brain*, *Times* (Weekly), *English Medicine*, *American Journal of the Medical Sciences*.

APPENDIX VI.

Classification of papers read by subjects:—General, 3; Psychology, 1; Archæology, 5; Sociology, 2; Mathematics, 2; Chemistry, 5; Mineralogy and Geology, 7; Jurisprudence, 1; Philology, 8; Meteorology, 1; Geographical Science, 2; Electricity, 1; Biology, 5; Astronomy, 2; Medicine, 2; Photography, 1; Industrial Science, 1; total, 49.

Read at section meetings, 23; total, 72, as follows: Biological section, 12; Architectural section, 8; Philological section, 3.

The election of officers for the ensuing year resulted as follows:

President—W. H. VanderSmissen, M.A.
Vice-President—E. A. Meredith, LL.D.
Treasurer—James Bain, jun.
Secretary—Alan Macdougall, M. Inst., C.E.
Editor—George Kennedy, M.A., LL.D.
Curator—David Boyle, Ph.B.
Librarian—G. E. Shaw, B.A.
Members of Council—W. H. Ellis, M.A., M.B.; Alexander Marling, LL.B. with the Chairman of Sections and Secretary of Biological Section.

On motion of Mr. Boyle, seconded by Mr. Browning, it was resolved, "That in the opinion of this meeting it is advisable to form a Historical and Archæological Section in connection with the Institute, and the President and Secretary are hereby empowered to make all preliminary arrangements for the purpose of forming a Section forthwith."

On motion of Mr. Shaw, seconded by Rev. Dr. McCurdy, it was resolved, "That the thanks of the Canadian Institute be tendered to the city daily papers and especially the *Mail* for their kindness in publishing reports of the proceedings of the Institute."

On motion of Dr. McCurdy, seconded by Mr. Keys, a vote of thanks was tendered to the retiring councillors.

A paper was presented by A. McGill, B.A., on "Tartaric Acid in Admixtures."

LIST OF COLEOPTERA COLLECTED BY MR. BRUCE BAILEY, IN KICKING HORSE PASS, ROCKY MOUNTAINS, C. P. R., 1884.

From a paper read before the Biological section by Mr. Brodie.

Mr. Bruce Bailey a member of this section, while on the Engineering staff of the mountain section of the C. P. R., made a large collection of Natural History objects, consisting of Mammals, Birds, Reptiles, Fish, Insects and plants. Several species of the Diptera and Hemiptera, have not yet been satisfactorily identified, and it is believed there are a few new to science. The following is a nearly complete list of the Coleoptera.

I am indebted to the eminent coleopterologist Mr. H. Ulke, of Washington, for the identifications, with a few exceptions. The species marked * are new to the Canadian list.

Carabidæ :—Cicindela longilabris, *Say.*
" 12-guttata, *Dej.*
Nebria trifaria, *Lec.**
" Mœsta, *Lec.*
Platynus bembidioides, *Kirb.*
" quadripunctatus, *Dej.*
Agonoderus lineola, *Fabr.*
Bembidium Grapii, *Gyll.**
" nigripes, *Kirb.*

Dytiscidæ:—Colmybites sculptilis, *Harr.*

Dermestidæ :—Anthrenus scrophulariæ, *Lec.**
Orphilus glabratus, *Fabr.**

Cucujidæ—Cucujus clavipes, *Fab.*

Trogositidæ :—Tenebrioides sinuata, *Lec.*
Calitys scabra, *Thun.*

Coccinellidæ :—Coccinella trifasciata, *Linn.*
Hippodamia 13-punctata, *Linn.*
Adalia frigida, *Schn.*
Anisocalvia 12-maculate, *Gebl.*
Scymnus lacustris, *Lec.*

Byrrhidæ :—Bryrrhus cyclophorus, *Kirb.*

Lucanidæ :—Platycerus depressus, *Lec.*

Scarabaeidæ :—Dichelonycha subvittata, *Lec.*
" Sulcata, *Lec.**
Serica frontalis, *Lec.**

Diplotaxis trevicollis, *Lec.*
Lachnosterna errans, *Lec.**
Trichius affiinis, *Gory.*

Buprestidæ:—Dicerca tenebrosa, *Kirby.*
Buprestis Langii, *Marin.**
“ radians, *Lec.**
Melanophila Drummondi, *Kirb.*
Anthaxia inornata, *Rand.*

Elateridæ:—Adelocera profusa, *Cand.*
Dolopius lateralis, *Esch.*
Corymbites furcifer, *Lec.**
“ pulcher, *Lec.*
“ insidiosus, *Lec.*
“ morulus, *Lec.*
“ æripennis, *Kirb.*
“ umibripennis, *Lec.**
“ fallax, *Say.**

Lampyridæ:—Eros mundus, *Say.*
Photinus lacustris. *Lec.*

Telephoridæ:—Podabrus puncticollis, *Kirb.*
“ Sp.———undetermined.*
Telephorus, Sp.———undetermined*
“ Sp.———undetermined.
Silis difficilis, *Lec.**

Malachidæ:—Melyris, Sp.———known not described.*

Cleridæ:—Trichodes ornatus, *Say.**
Cierus undulatus, *Say.*

Spondylidæ:—Spondylis upiformis, *Mann.*

Cerambycidæ:—Asemum mœstum, *Hald.*
Hylotrupe ligneus, *Fab.*
Callidium janthinum, *Lec.*
Clytus 3-vittatus, *Meb.**
Xylotrechus undulatus, *Say.*
Neoclytus, Sp.———probably new.*
Rhagium lineatus, *Oliv.*
Acmæops pratensis, *Laich.*
“ longicornis, *Kirb.**
Leptura sex-maculata, *Linn.*
“ sanguinea, *Lec.*
“ chrysocoma, *Kirb.**
“ canadensis, *Fab.*
Monohammus maculosus, *Hald.**
“ scutellatus, *Say.*

Chrysomelidæ:—Orsodachna atra, *Ahr.*

Syneta ferruginea, _Germ._
Pachybrachys femoratus, _Oliv._*
Adoxus vitis, _Linn._
Tenebrionidæ:—**Iphthinus serratus**, _Mann._
Phellopsis obcordata, _Lec._
Melandryidæ:—**Allopoda lutea**, _Hald._*
Phryganophilus collaris, _Lec._
Mordellidæ:—**Anaspis atra**, _Lec._*
Mordella scutellaris, _Fab._
Œdemeridæ:—**Ditylus cœruleus**, _Rand._
Pythidæ:—**Pytho niger**, _Kirb._
Otiorhynchidæ:—**Evotus naso**, _Lec._
Scythropus elegans, _Coup._
Rhynchitidæ:—**Rhynchites bicolor**, _Fabr._
Curculionidæ:—**Anthonomous musculus**, _Say._
Scolytidæ:—**Dendroctonus terebrans**, _Oliv._

INDIAN LANGUAGES AND LITERATURE IN MANITOBA, NORTH-WEST TERRITORIES AND BRITISH COLUMBIA.

Dr. Rae in a lecture delivered at the London Institution stated that in the Northern part of Canada there were five hundred different Indian languages, divisible into seventy-five ethnical groups.

I am unable from my reading and observation to corroborate this statement, but give the results of my studies and experience in the following notes.

I. _List of Languages in Manitoba, Keewatin and North-West Territories._

1. The Sioux Language—A small band of these Indians is located near Portage la Prairie

2. The Stony Language—This is a dialect of the Assiniboine or Dakotah Indians. They are located at Morley, on the C.P.R. forty miles west of Calgary and on a reserve near Edmonton.

3. Ojibway Language—Some of these Indians may be found around Lake Superior.

4. The Saulteaux Language—This is a dialect of the Ojibway. These Indians are to be found in the vicinity of Hudson's Bay and near Norway House.

5. Sarcee Language—This is the same language as the Castor or Beaver. These Indians are located on a reserve about eight miles south of Calgary. There is not a white man in the country conversant with the language, and all interpreting is done in Blackfoot or Cree which these Indians understand.

6. The Beaver Language—These Indians are found in Athabaska.

7. Cree Language—Divided into Plain Cree, Wood Cree and Swampy Cree. These Indians are numerous and are located on the plains and in the forests, all over the North-west and Keewatin.

8. Blackfoot Language—Spoken by the Bloods, Piegans and Blackfeet.

9. Nez Percé Language—A few of these Indians occasionally reside at Pincher Creek, thirty miles west of Macleod. They are United States Indians.

10. Slave Language.

11. Dog Rib Language.

12. Chippewayan Language.

13. Dinje or Loucheux Language.

14. Hare Language—These all belong to the Tinné family and are found in Athabaska and Alaska.

15. Eskimo Language.

16. Tukudh Language.

II. *Languages in British Columbia.*

1. Bella Bella.
2. Bella Coola.
3. Tsimpshean.
4. Nimpkish.
5. Hydah.
6. Chinook Jargon.
7. Cowichan.

III. *The Languages of which Vocabularies and Grammars have been published, the Authors and place of publication.*

1. Sioux—A Grammar and Dictionary of the Dakotah Language. Edited by Rev. S. Rigg, D.D., Washington, 1852, $10. A new edition is now in course of preparation.

2. Ojibway—A Grammar and Dictionary of the Otchipwe Language By R. R. Bishop Baraga, new edition, 1879, $3. Beauchemin and Valois, Publishers, 256. 258. St. Paul Street,

Montreal. There are several grammars and dictionaries prepared for the Ojibway of Ontario, etc.

3. Cree Language—(1) A Grammar and Dictionary of the Cree Language in French by Rev. Pere Albert Lacomb, O.M.I. $3. Beauchemin and Valois, Montreal. (2) A Cree Dictionary by Rev. E A. Watkins, published by the Society for Promoting Christian Knowledge, London, England. (3) A Grammar of the Cree Language by Right Rev. Bishop Horden, published by the Society for Promoting Christian Knowledge, London, England. (4) Grammar of the Cree Language by Henry Howse, London, England, 1815, now out of print. This is said to be the best Cree Grammar published. (5) A Lecture on the Grammatical Construction of the Cree Language by the Ven. Archdeacon Hunter, M.A., 1875, by the Society for Promoting Christian Knowledge, London, England. This contains Paradigms of the Cree Verb with its various conjugations, moods, tenses, inflections, etc.

4. The Blackfoot Language—A small phrase book was published as a money speculation by C. Lanning, but it is full of mistakes and of very little use. Nearly all the missionaries have MSS. vocabularies for their own use. I can only speak positively of my own work on Grammar and Dictionary which I have been working at for years, and will take three years at least to finish.

5. Eskimo—Paradigm of the Verb, by Dr. A. Pfizmaier, Vienna. "The Eskimo Dialects as serving to determine the relationship between the Eskimo Tribes," published in the journal of the Anthropological Institute, by Dr. Rink. Both of these are on the Greenlandic Dialect.

6. Addendum re Cree Language—Rev. Archdeacon John McKay, Prince Albert College, N. W. T., has a MSS. grammar in Cree which he is preparing to publish.

7. Addenda re Languages in British Columbia.
Kwakiute.
Bilhoola.
Clallam.
Lummi.
Snohomish or Nisqually.
Chehalis.
Twana.

These last five are found on Puget Sound, W. T., and in British Columbia. There are very many dialects of these.

8. Bella Coola or Viloula—Dr. Frank Boaz is making a special study of these Indians at present. See Mittheilungen aus der Ethnologischen Abtheilung der Museum zu Berlin.

9. Chinook Jargon—(1) "Dictionary of the Chinook Jargon or Indian Trade Language of the North Pacific Coast," 1883, 35 pages. T. N. Hibben & Co., Victoria, B.C. (2) Dr. George Gibbs, Report on Chinook, etc., published by Smithsonian Institute, 1863, Vol I. Contributions to North American Ethnology.

10. Bilhoola—A brief grammatical sketch of this dialect is found in "Science," of New York, March 5th, 1886, by Dr. Frank Boaz.

11. Nisqually—A Vocabulary was prepared by Dr. George Gibbs and published in Vol I. Contributions to North American Ethnology.

12. Clallam and Lummi—A Dictionary prepared by Dr. George Gibbs and published in Shea's Library of American Linguistics.

13. Snohomish and Chehalis—Comparative Vocabularies of the Tribes of British Columbia by Tolmie and Dawson, 1884, published in Montreal.

Further study and observation may be productive of more information on this subject.

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Blood Reserve.
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SYNOPSIS OF A PAPER READ BEFORE THE BIOLOGICAL SECTION BY DR. GARNIER ON A NEW SPECIES OF MENOBRANCHUS.

Dr. Garnier presented an account of a species of Menobranchus which he believes to be new, and dedicates to Mons. F. Lataste as *M. Latastei.* Prof. Cope, to whom a sample was submitted, regards it as a well-marked variety of the ordinary northern Menobranch *Necturus lateralis,* Baird, which would accordingly bear the name *N. lateralis var. Latastei.* Garnier.

The following are the points which Dr. Garnier thinks entitle the

Menobranchus under consideration to rank as a separate species. (1) Smaller size. (2) Colouration, the body being entirely black except the gular fold which is white, the abdomen which is sooty and the toes and an occasional present band at the base of the tail which are olive brown. (3) Proportionately greater size of the head. (4) The smaller number of teeth, especially on the vomers, superior maxillaries and mandibles, and (5) habitat, the form under consideration being always found in swift streams, not in sluggish waters.

Dr. Garnier gives some particulars as to his observations of the habits of the Menobranchus he has studied. He finds they do not survive more than two or three hours out of water; they swim rapidly, compressing the limbs against the trunk; and shelter themselves in crevices and under stones; they eat small living fish and cray-fish by preference, and do not readily take meat in captivity; they spawn towards the beginning of May, laying eggs which measure in the ordinary species quarter of an inch in diameter but in the *var. latastei* three-sixteenths; during the spawning time the cloaca becomes swollen and the tail stiffer as in Proteus. The ordinary lake Menobranchus are often taken by fishermen in the winter in lake St. Clair, and like the dog-fish (Amia) and like sheepshead are regarded as unwelcome additions to the catches in seines.

The variety *Latastei* has been found by Dr. Garnier in the Maitland river, the ordinary Menobranchus with which he has compared it having been obtained from the Don and lake St. Clair, where they are common.

UMBRIA CAPTA.

READ BEFORE THE PHILOLOGICAL SECTION BY REV. N. MACNISH, B.D. LL.D. APRIL 25TH, 1887.

I have the honour to present to the Canadian Institute a new interpretation of the Umbrian portion of the Eugubine Tables. I have to remark at the outset, that I have derived very great assistance, as well in the interpretation of the Tables as in the preparation of the geographical and ethnological notes which are appended, from the Rev. Professor Campbell, of Montreal, whose learning and researches in this particular field of investigation have been conspicuously exhibited in his *Etruria Capta.* It will be possible, I believe, to adduce satisfactory evidence to show that Gaelic is the language of the Umbrian Tables; and that, accordingly, they present to us altogether the oldest specimen that has hitherto been discovered, of Irish and Scottish Gaelic. As even the learned and laborious Celtic Grammarian Zeuss was not led to turn his attention to the Gaelic characters of those Tables, no material assistance is furnished by his elaborate Grammar in determining the grammatical forms of what has to be regarded now as the oldest Gaelic composition in the world. Mr. Whitley Stokes who has given extensive and scholarly attention to old and early middle Irish Glosses, enables us to perceive, *e.g.*, in his *Goidelica*—that the Turin Glosses, etc., and the Irish Hymns in the *Liber Hymnorum,* forming as those do some of the oldest Irish compositions of which we have had hitherto any knowledge—present fully as large combinations of words and peculiarities of grammatical construction as are to be found in the Umbrian Tables. The same remark may be made regarding the very old specimen of Scottish Gaelic which is contained in the Book of Deir; and also regarding the first book which was printed in Scottish Gaelic; viz., the Gaelic translation of John Knox's Liturgy, by Bishop Carswell of Argyll· It was published in 1567.

In his History of Rome (Vol. I. p. 160), Mommsen states that "our information regarding the migration of Umbrian stocks comes to us like the sound of bells from a town that has been sunk in the sea." Niebuhr in his History of Rome (Vol. I. p. 143) thus writes; "It is certain that the Umbrians were a great nation before the time of the Etrurians in the age of the Sicilians, and that they have the right to the name of a most ancient and genuine people of Italy." The same learned writer remarks in his Ethnography and Geography (Vol. II. p. 209) "that people have been extremely anxious to discover the Etrurian language, and who should not be so? I would readily give a considerable part of my property as a prize to any one who should discover it. An entirely new light would thereby be thrown upon the character of the nations of Italy."

The *Tabulae Eugubinae* were discovered in 1444 among the ruins of a Theatre in the neighbourhood of Gubbio in Umbria. Gubbio is the modern name of Iguvium. It has been maintained that those Tablets which were made, as Concioli asserts, *ex aere purissimo*, were originally nine in number. Two of the Tablets which were conveyed to Venice in 1540, have, it is to be feared, been irrecoverably lost. The seven that remain are preserved in the Palazzo Municipale of Gubbio. Tablets I., II., V. and VI. are engraved on both sides. A blank space is left on one side of Tablet II. and V. A few lines merely are engraved on one side of Tablet VII. The Inscriptions on Tablets VI. and VII. and nearly all the Inscriptions on one side of Tablet V. are in Roman letters.

According to the computation of Aufrecht and Kirchoff:

Table VI., *a*, has 59 lines.
Table VI., *b*, has 65 lines.
Table VII., *a*, has 54 lines.
Table VII., *b*, has 4 lines.
Table V., *b*, has 11 lines.

There are thus 193 lines in the Umbrian portion of the Eugubine Tables.

In his preface to his *Les Tables Eugubines*, Professor Bréal gives an interesting account of the various efforts which have been made to interpret those Tables. It is noteworthy, from a Celtic point of view, that there appeared in 1772 a work by Stanisias Bardetti, in which he endeavoured to explain the Umbrian Inscriptions principally by the aid of Anglo-Saxon, old High German and Celtic. In an article on the Eugubine Tables which occurs in the Encyclopaedia Britannica, it is stated among other things that "Aufrecht and Kirchhoff. summing up the labours of their predecessors and working according to strict scientific method, brought the interpretation of the Tables to a degree of perfection that could hardly have been hoped for, though there still remained in matters of detail sufficient scope for such investigators as Bréal, Ebel, Corssen, etc." Professor Bréal's *Les Tables Eugubines* was published in 1875. As, in addition to his own unambiguous asseverations, he has come to be regarded as having at last succeeded in giving an intelligible and satisfactory solution of the Umbrian Inscriptions, it is advisable to insert here the conclusions at which he has arrived. "The Eugubine Tables are the acts of a Corporation of priests who had their seats at Iguvium, and whose authority appears to have extended over a somewhat large extent of the adjacent country. They call themselves the Attidian Brethren, and the name of the Confraternity is given to the College. They are twelve in number. Different names of magistracy such as questor and fratrecks are mentioned. The person who plays the principal part has the title of *adfertur*. . . . It does not appear that the Attidian Confraternity was specially devoted to the service of a single divinity. We perceive that it offered sacrifices to an entire series of gods and goddesses. Thanks to that circumstance, the Eugubine Tables furnish us with precious indications of the Pantheon of an Italian people. Certain names coincide exactly with Roman names. Such are Jupiter, Sancus and Mars. Other names present a resemblance more or less remote as Fiscus, Grabovius, Cerfius. Other names, again, were entirely unknown, as Vofonius, Tefer, Trebus, etc. We have here, then, the monuments of an indigenous worship which the Roman religion had not yet effaced."

I have taken from the Umbrian Inscriptions certain words which any one who has even a moderate knowledge of Irish or Scottish Gaelic, can have no difficulty in admitting to be Gaelic. The combinations which are formed between prepositions and personal pronouns in Gaelic, present a striking peculiarity of the Gaelic languages. Pictet in his *De l' affinité des Langues Celtiques avec le Sanscrit* (pp. 170. 171.) virtually maintains that the points of difference between the Celtic languages and the other members of the Indo-European family of languages are confined, " to the permutation of initial consonants, and to the composition of personal pronouns with prepositions." " Quant aux composès pronominaux. . . . s'ils sont étrangers aux autres branches de la famille ils offrent une analogie très curieuse avec les langues finnoises." In his *Grammatica Celtica* (p. 324.) Zeuss writes " Pronominum in utraque lingua, tam Hibernica quam Britannica ea proprietas est, ut non semper ut in aliis linguis Indeuropaeis per se posita plenam formam servent, sed etiam. . . . si sunt personalia post praepositiones suffigantur." It thus appears that Scholars like Pictet and Zeuss regard the composition of personal pronouns with prepositions as a peculiar feature in the Celtic languages.

I have chosen to consider the prepositional pronouns which I am about to cite and which occur repeatedly in the Inscriptions, *in* and *by* themselves, and apart from the particular meaning which they may bear in the place which they occupy in the Tables; in order that thus their purely Gaelic character may appear in its simplest manner.

Esto, *as iad*, *asta*, out of them.
Este, *aiste*, out of her.
Eesteso, *aiste so*, out of this one, *an deigh so*, after this.
Est, *asad*, out of thee, *asda*, out of them.
Eso, *as so*, out of this.
Dersva, *dar iad*, *thar iad* and *tharta*, over them.
Dersas, *dar thar iadsan*, *thartasan*, over them.
Dersaus, *thar iadsan*, *thartasan*, over them or over these very persons.
Nersa, *air ais*, back and backwards.
Erus, *air ais*, back and backwards.
Eno, *ann e*, *ann*, in him.
Eam, *annam*, in me, and again with me *aig mi*.
Erer, *air ear*, *air an ear*, on the east.
Erar, *air iar*, *air an iar*, on the west.
Enom, *ann mi*, *annam*, in me.
Ero, *air e*, *air*, in him, *air thu*, *ort*, in thee.
Erom, *air mi*, *orm*, on me.
Esome, *asmi*, *asam*, out of me.
Aso, *as thu*, *asad*, out of thee.
Ouse, *o* or *bho thusa uait uaitse*, from thee.
Ose, *o bho se e uaithe*, from him.
Etru, *eatorra*, between them, *eadar thu*, between thee.
Deitu, *do thusa*, *duit*, *duitsa*, to thee.
Difne, *do sibh*, *duibh*, *duibhse*, to you.
Fri, (Irish) with by.
Frif, *fri sibh*, with and by you.
Frite, *fri iad*, *iadsan*, by and with them.
Treif, *tre sibh tromhaibh*, through you.
Vovse, *bho sibhse*, *bhuaibhse*, *uaibhse*, from you.
Pusi, *bho si i*, from her.
Puse, *bho se e*. from him.
Reste, *ri* or *ris ise iadsan*, to her, to them.
Riutha, *riuthasan*, to them, themselves.

I shall now cite several words which reveal their Gaelic lineage at a glance, and which along with the prepositional compounds that have been enumerated, go far to establish the Gaelic character of the Umbrian Inscriptions.

Enetu, *an aite*, in place of.
Nesimei, *a m' ionnsuidh*, to or towards me, *ionnsaighim*, I attack.
Ficla, *fo cheile*, asunder.
Hondra, *aon trath*, one time, *an trath*, the time, when.
Screihtor, *sgriosadair*, a destroyer.
Verisco, *fearachas*, manhood.
Esona, *easaon*, without one, disagreeing.
Socair, quiet.
Ferine, *fearran*, *ainn*, land.
Arvio, *arbhar*, corn.
Heri, *or oir*, gold.
Vini, *fainne*, ring.
Poni, *bonn buinn*, coin coins.
Scalseto, *sgaoil*, scatter.
Tases, pl., *Tasetor*, *toiseach*, a leader, the *Intosh* in MacIntosh, the *Toiseach* of Mediaeval times in Scotland.
Surunt, *saor*, free, *aonta*, consent.
Serse, *srac*, tear.
Seritu, *saruich*. harass.
Esisco, *sasuich*, satisfy.
Paca, *bac*, restrain.
Osatu, *osadh*, *osaim*, I desist.
Fetu, *faighteadh*, *faigh*, get.
Covertor, *cobhartach*, booty.
Prestotu, *brisdeadh*, *brisd*, break.
Portatu, *furtaich*, help.
Eine, *feadhainn*, people, *fine*, a tribe.
Cuirnase, *cuir*, put.
Mehe, *maoidh*, threaten.
Ote, *eadhon*, even.
Mucatu, *mothuich*, perceive.
Arsir, *aithris*, tell.
Porsi, *purr*, push.
Trebeit, *tearb*, separate.
Ehcleir, *ath-ghlac*, capture again.
Sent, *sannt*, desire.

Tote, *tath*, *tathaim*, (Ir.), unite.
Tuer, *taobh*, side with.
Naratu, *an iarruidh*, *iarr*, ask.
Strusla, *sruthail*, *streachlaim*, I tear.
Farsio, *bris*, break.
Tenitu, *thig*, *thainig*, come.
Persontu, *brosnuich*, incite.
Efrar, *tabhuir bheir*, give.
Aitu, *aidich*, confess.
Turse, *tuirse*, *tuir*, lament.
Eiscrent, *Eascaraid*, enemy.
Fratrus, *brath*, betray.
Ocrer, *acarach*, kind, gentle,
Peracri, *furachair*, watchful.
Pihafi, *bho bhuaidh*, *buadhmhor*, victorious.
Tertiu, *deireadh*, last.
Sir, *sir*, ask.
Sorsalem, *surdail*, *surdamhail*, active.
Mescapla, *mishiobhalta*, uncivil.

Another strong argument in favour of the contention that Gaelic is the language of the Umbrian Tables can be extracted from the numerous words or verbs that terminate in *mu*, *me*, *am*, *om*, *e. g.*

Arsmo, *arsa mi*, said I.
Carsome, *greasaim*, I hurry.
Hondome, *aontuighim*, I assent.
Spahmei, *spochaim*, I rob.
Persnimu, *brosnuighim*, I incite.
Purome, *tabhaiream*, *tabhraim*, I give.
Pertome, *bhruthaim*, I bruise.
Tettome, *dithighim*, I crush.
Todcome, *tudhchaidhim*, I come.
Vocucom, *boghaighim*, I beseech.

Those verbs readily disclose their Gaelic character. The terminations *mei*, *me*, *mo*, *am*, *mu*, are merely the first personal pronoun which is appended to Gaelic verbs. I have given the Irish equivalent of the verbs which have just been cited. A *present* tense is recognized by Irish Grammarians, while in Scottish Gaelic the tenses are, the *past* and the *future* merely; the other tenses, the present among the rest, being compounded of the substantive verb and of portions of the verb that is under consideration. It is the *present* tense of the Irish verb that I have given as the equivalent of the verbs which I have taken from the Inscriptions. Several, indeed all, of the verbs in question could easily assume a Gaelic form and preserve the distinctive termination of Gaelic verbs, e. g.

Hondome, dh-aontaich mi, I assented.
Carsome, ghreas mi, I hurried.
Persnimu, bhrosnuich mi, I incited.
Pertome, bhruth mi, I bruised.
Purome, bheir mi, I will give.
Tettome, dhithich mi, I destroyed.
Todcome, thainig mi, I came.
Spahmei, spoch mi, I robbed, etc.

It is thus the past tense of the Gaelic verb that represents the present tense of the Irish verb. It may be well to observe that the aspiration of words in Irish Gaelic is effected by placing a dot over them, and that in Scottish Gaelic aspiration is effected by inserting the letter *h*. It may be remarked here, that the evidence which the verbs under consideration furnish, is in favour of the contention of Irish Grammarians respecting the antiquity of the *present tense*, and against the opinion of Gaelic Grammarians, that Scottish Gaelic is more ancient than Irish Gaelic, because it has a past and future tense merely, and because it is thus on the same level with the Semitic languages so far as the number of tenses is concerned.

Stahmei, stad mi, shuidhich mi, I settled.
Asame, asam, I make.
Smuirsime. smuais mi, I break to pieces.
Tertiamne, tairthighim, I save.
Randeme, raonaim, I defeat.
Totam, tathaim, I unite.
Proman, pronnaim, I give.
Pesnimu, beascnaighim, I grant.
Eturstahmu, dh- eadar shuidhich mi, I interposed.
Termnome, thearmunnaich mi, I protected.

Here are additional verbs which occur in the Inscriptions, and which corroborate the argument that I have sought to extract from the termination *mu*, *me*, *am*, *om*, representing as those monosyllables do the first personal pronoun in Gaelic.

The preterite tense, Indicative, Active, of modern Irish verbs is thus declined, *e. g.*, *mol-aim*, I praise

Singular.	Plural.
1. *Mhol-as.*	1. *Mhol-amar.*
2. *Mhol-ais.*	2. *Mhol-abhar.*
3. *Mhol-se.*	3. *Mhol-adar.*

There are to be found in the Umbrian Tables several words with terminations similar to those of the plural which has now been given *e. g.*

Fisier, *bhiomar*, we were, or *bhiobhar*, you were.
Arsmor, *arsa mar*, we said.
Totaper, *Totar*, *tath-abhar*, you joined.
Surur, *shaor-abhar*, you freed.
Tuer, *thaobh-abhar*, you sided.
Serfiar, *shearbh-abhar*, yon embittered.
Motar, *mhoid-abhar*, you vowed.
Nomneper, *dh-aom-abhar*, you inclined.

Nomneper is a verb that occurs frequently in the Inscriptions. It is doubtless the second person plural, past indicative, active of *aom*, I incline, *aomaim*. Zeuss contends that *nu* or *no* prefixed to a verb is the mark of a completed action. In this manner, the presence of *n* in *nomneper*, standing as it does for *nu* or *no*, can be satisfactorily explained. Pictet in his well-known book to which reference has been made already, remarks (p. 152.) "that the second person plural of Irish verbs has two suffixes which are commonly used, *thaoi* and *bhar*." The second Irish form *bhar* which has, I believe, no analogy in any other European language is employed in the *present*, the *past* and the *future*, *e. g.*, *Mealabhar*, you deceive; *Mealfabhar*, you will deceive; *thangabhar*, you came." According to the high authority of Pictet, therefore, *bhar* as the termination of the second person plural of verbs is confined to the Celtic languages. The words which have been already adduced along with other words in the Inscriptions that may fairly be construed and expanded in a similar manner, clearly lead to the conclusion, that *bhar* as the termination of the second person plural of verbs is to be found frequently in the Umbrian Tables, and that additional evidence is thereby furnished in favour of their purely Gaelic character.

Fisi, fisim, fisiem, fisie, fisier, fisio, futu, pifi, bue, sei; here are words which occur very often in the Umbrian Tables. They are doubtless parts of the Celtic substantive verb, and present to us, therefore, very old forms of that verb. The very sound of those words will convince any one who has even a slight acquaintance with Gaelic as it is spoken, that their Gaelic character is unmistakable; for they call up several forms of the substantive verb as it is known in Gaelic, *e. g.*

Fisi; bha e or *i bha esan* or *ise*, he or she was.
bhidhis, thou wast, *bhi se*, he was, *bhidheas*, I was.
bhidheadh e or *bhiodh e*, he would be.
bi thusa or *bisa*, be thou.
bitheadh e or *i*, let him or her be.
bithidh e or *i*, he or she will be.

Fisim; } *bitheam*, let me be, *bha mi*, I was.
Fisiem; } *bithidh mi*, I shall be.
bidhim, I am accustomed to be.
bhidhinn, I used to be.
bhithinn, I would be.

Fisie; bithidh e he will be, *bitheadh e*, let him be.
bhitheadh e, he would be, *bhiodh i*.
bhidheas, I was, *bhi se*, he was.
bia or *biaidh se*, he will be.
bidhir, bir, thou usually art.

Fisier; bhiomar, we were, *bhiobhar*, you were.
bhiodar, they were, *biair*, thou shalt be.
bheithi, you could be, *beidhir*, thou shalt be.
bhatar, bhathar, was; *bitear bithear*, will he.
bhitheadh iad, they would be; *bha iad*, they were.

Fisiv; bithibh, be ye, *bha sibh*, you were, *bithidh sibh*, you will be, *bhitheadh sibh*, *bhiodh sibh*, you would be.
bithi, you are; *bhidhis*, thou art; *bidhidh*, be ye; *bhithi*, you were.

Futu; bha thu, thou wast, *bu thu*, it was thou.
bhitheadh thu or *bhiodh tu*, thou wouldst be.
bhidhthea, thou wast wont to be, *bhithi*, you were wont to be.
biathaoi, you will be, *bheidhthea*, you would be.

Pifi ; bu mhi, it was I, *bithibh*, be ye.
bithi, you are, *bhithi*, you used to be.
Bue ; } *bu e*, it was he, *b' e*.
Budh ; } *ba h-e*, it was he, *ba*, it was, *budh*, it was.
fa, it was, *bhus*, *budh*, *bidh*, *pu*, it will be.
Sei ; is e or *is i*, it is he or she, *s e*, *'s i*.
is he or *it e*, it is he.
is si, it is she.

It is thus abundantly evident that there is a close correspondence between *fisi*, *fisim*, *fisiem*, *fisier*, *etc.*, and numerous portions of the Irish and Gaelic Substantive verbs. There is likewise a close correspondence between some of the words in question and certain parts of the substantive verb in Armorican, *e. g.*

Imperative Mood.	*Bez*, be thou.
	Bezet, let him or her be.
	Bezomp, let us be.
	Bezit, be ye.
	Bezent, let them be.
Future Indicative.	*Bezinn*, I shall be.
	Bezi, thou shall be.
	Bezo, he shall be.
	Bezimp, we shall be.
	Bezot or *biot*, you shall be.
	Bezint, they shall be.

In consideration of the conclusive evidence that has been adduced that *fisio*, *fisi*, *fisim*, *etc.*, belong to the Substantive verb in Gaelic; is it not a little surprising that *fisi* has been magnified into a Divinity *Fisus* by Bréal and others, and that *ocre Fisi* has been metamorphosed into *Colli Fisio*, the Fisian Hill? Can elaborate ingenuity go to a more untenable extreme, or expend itself in more unlikely and indefensible conjectures?

As Umbrian Gaelic is so very much older than any Gaelic writings of which there has hitherto in modern times been any knowledge, it is from the Inscriptions themselves that all grammatical rules and forms must be derived. A few Grammatical references will not here be inappropriate, as bearing on the Gaelic character of the Tables, There are various terminations of the nominative singular of nouns *e. g.*, *ei*, *ne*, *a*, *tor*, *as*, *re*, *te*, *us*, *u*. Forms of the genitive singular are *is*, *no*, *a*, *o*. Forms of the dative singular are *a*, *ef*, *o*, *etc.* The nominative plural of proper names generally terminates in *er*, *ir*, *ar*, *e. g.*

Pelmner, the Flamonenses.
Perscler, the Perscli.
Rufrer, the Orbii.
Salier, the Salassi.
Atiersir, the Taurisci.
Popler, the Populonii.
Treblanir, the Triumpiliui.
Aseriater, the Asseriates.
Peihaner, the Vicumniae.
Nonair, the Nannes.
Hoier, the Euganei.
Paveller, the Medulli.
Serser, the Isarci.
Tesonocir, the Ticinates, etc.

The common termination in modern Irish and Scottish Gaelic for patronymics and national and tribal names is *ach e. g.* *Albannach*, a Scotchman; *Eirionnach*, an Irishman; *Sasunnach*, an Englishman; *Frangach*, a Frenchman; *Caimbeulach*, a Campbell; *Camaronach*, a Cameron. There is thus a marked difference between the Umbrian and the modern method among Gaels of expressing patronymics and tribal names. In his minute examination and collation of the Celtic languages, Pictet was led to conclude, " En Irlandais, *ara*, *aire*, *ar*, *air*, *oir*, et en gallots *awr* forment principalement des appellatives et des noms d' agents." I believe that the endings *er*, *ir*, *ar* of the plural nouns which I have cited, represent *feara*, *fir*, the Gaelic words for men. Very common in Gaelic is the combination of *fear* with other nouns to indicate a trade or calling, *e. g.*

Clachair, a mason.
Saighdear, a soldier.
Seoladair, a sailor.
Sgoilear, a scholar.
Figheadair, a weaver, etc

The plural of such nouns as those ends in *an* or *ean*.

Fear, a man, is thus declined :

Singular.	Plural.
N. *Fear*,	*Fir*, *Feara*,
G. *Fir*,	*Fhear*,
D. *Fear*,	*Fearaibh*,
S. *Fear*,	*Fear*,
V. *Fhir*,	*Fheara*,

In the numerous proper names which occur in the Inscriptions with the endings *er*, *ir*, *ar*, in the nominative plural : the Gaelic *fir*, *feara* is present ; so that the words will signify, *Perscler*, the men of the Perscli, *Popler*, the men of Populonia, etc. Those terminations are eminently Gaelic; and though the collocation or composition of the proper names in question has no exact counterpart in modern Irish or Scottish Gaelic, resemblances there are of such strength and clearness as to establish the Gaelic character of those Umbrian syllables or endings.

In Irish and Scottish Gaelic, in Manx and Welsh though not in Armorican, adjectives are declined, and, therefore, undergo inflection as nouns do. The same peculiarity attaches to adjectives in the Umbrian Inscriptions, *e. g.*

Avvei mersta,	*Aveif merstaf,*	*Mersta ancla,*
Ocrer peihaner,	*Ocre fisie,*	*Ocriper fisiv,*
Ocrem fisiem,	*Ocre fisim,*	*Totar ijovina,*
Totar ijovinar,	*Tote jovine,*	*Totam ijovinam,*
Toteme jovinem,	*Tote tarsinate,*	*Totar tarsinater,*
Totam tarsinatem,	*Trifo tarsinatem,*	*Trifor tarsinater,*
Trifo tarsinate,	*Tote ijovine erer nomne,*	
Nomner Naharcer Tapuscer, Tuscom Naharcom Tapuscom nome.		
Purdito fust	*Capif purdita,*	*Purditom fust,*
Peracrei,	*Peracrio tursituto,*	*Acre tlatie,*
Acre casilos,	*Casilis Herti,*	*Casilate diram Herti.*

Mersta, *ocre*, *tote* or *tota*, *trifor*, *nomne*, *purdita*, *peracrei*, *casiler* : Here are adjectives, whether verbal or otherwise which indicate conclusively in the connection where they are found, that they fulfil the condition of Celtic adjectives, and undergo inflections in the same manner as the nouns that they qualify do. I am disposed to regard *ocriper* and *ocreper* as a comparative form of *ocre (i. e. acarach).* Zeuss indeed calls attention to a rare termination *thir* of the comparative degree of adjectives. There is a resemblance between the *per* of *ocriper* and the *thir* which is mentioned by Zeuss.

The Infinitive of verbs in Irish and Scottish Gaelic generally ends in *adh*. In the Umbrian Inscriptions *tu* is the common ending of the Infinitive, corresponding thus very closely to *te* and *ta*, the ending of the past participle of Gaelic verbs. It is evident that the form of the verb which indicated the Infinitive in the Umbrian language, now appears in the past participle of Gaelic verbs. The correspondence between the Infinitive forms of the Inscriptions and the past participles of modern Gaelic verbs, is so apparent as not only to be readily recognized in the case of several verbs but also to furnish another argument in favour of the Gaelic character of the Umbrian Tables, *e. g.*

	Past Participle.
Merstu, to err, *mearaighim*,	*mearaighthe.* (Irish)
Ehveltu, to revenge, *aichbheilich*,	*aichbheilichte.*
Serse, to tear, *srac*,	*sracta, srachdta.*
Seritu, to harass, *saraich*,	*saraichte.*
Esisco, to satisfy, *sasaich*,	*sasaichte.*
Carsitu, to hurry, *greas*,	*greasta.*
Habitu, to desist, *ob*,	*obta, air obadh.*
Paca, to hinder, *bac*,	*bacta, air bacadh.*
Pihatu, to conquer, *buadhaich*,	*buadhaichte.*
Naratu, to ask, *iarr*,	*iarrta.*
Fetu, to get, *faigh*,	*faighte, faighteadh.*
Trebeit, to separate, *tearb*,	*tearbta.*
Ditu, to press, *dith*,	*dite.*
Osatu, to desist, *osaim*,	*osta, air osadh.*
Tenitu, to come, *thig*,	*air tighinn.*
Stiplo, to go, *siubhail*,	*siubhailte.*
Stiplatu, to cast out, *stapla.* (Armorican)	
Covertu, to assist, *cabhair*,	*cabhairte.*
Amboltu, to hinder, *amail*,	*amailte.*
Portatu, to help, *furtaich*,	*furtaichte.*
Stahito, to arrange, *suidhich*,	*suidhichte.*
Prestotu, to break, *brisd*,	*briste.*
Etuto, to refuse, *eitich*,	*eitichte.*
Vesticatu, to hire, *fasdaidh*,	*fasdaidhte.*
Aitu, to confess, *aidich*,	*aidichte.*
Combifiatu, to vow together, *comhbhoidich*,	*comhbhoidichte.*
Tefruto, to give, *tabhair*,	*tabhairt, toirt.*
Furo, to bend, *fiar*,	*fiarta.*
Tesedi, to cut, *teasgaim*,	*teasgta.*

It is vain at this distance of time, and in the absence of any trustworthy guide whatsoever, to entertain the hope, that it will be possible to reproduce with accuracy the peculiar method which the Umbrians followed in pronouncing their language, or to ascertain the exact value which they attached to any given letters or syllables.

An internal argument which admits of great elaboration can be drawn from the Inscriptions themselves in support of their Celtic character, inasmuch as several interpretations of given phrases present themselves with instant readiness;—interpretations that are purely Celtic and that have to do with Celtic roots and words, and with those alone. A few illustrations will suffice:

Table VI. *a.*
Line 1. *Curnase, chuirinn se,* I would place him.
Chuir iade, They place him.
Chuir iad esan, They placed him, i. e., that very person.
2. *Eesteso, An deigh so,* after this.
aiste so, out of this one.
5. *Stahmei, stahmeitei.*
Eisidhim—amaoid I decide, we decide.
Stad mi, I stopped.
Shuidhich mi, I settled.
Esmei, aicme, tribe.
Is mi, it is I.
'Us mi, and I.
6. *Stu. sosda,* a city.
aisde, out of her.
stigh, inside.
stuth, substance.
7. *Sue. suaip,* exchange.
so e, this is he.
shuidh e, he sat.
8. *Verfale. buair fala,* tempt in vain.
fir a' bhaile, townsmen.
9. *Nesimei. a m' ionnsuidh,* towards me.
ionnsaighim, I attack.
thiomndaidh mi, I turned.
Somo. seasaim, I stand.
sheas mi, I stood.
so mi, here I am.
suidhidh mi, I will set.
11. *Eine. fine* a tribe.
feadhainn, people.

12. *Foserclome. fiosrachailim,* I knowing.
Bha sireadh leam, there was seeking by me.
Bha aircill leam, there was lying in wait by me.

13. *Smursime. smuais mi,* I broke to pieces.
smur chum, to the dust.

19. *Vasor verisco. bhasmhor fearachas,* deadly manhood.
fasmhor fearachas, thriving manhood.

20. *Paca ostensendi eso iso ostendu.*
bac ioc dean cain a siad ioc dean.
To withdraw the tribute which they paid.
bacadh an staonachaidh a bha iad a' staonachadh.
checking the inclination to which they were tending.

21. *Teio-subocav suboco,*
Tiom-suighim suibhich, To gather together, a gathering.
Tha sibh subhachas subhach,
You are cheerful in your happiness.

22. *Fos sei pacer sei,*
Fos ise feochair ise, Still let your valour appear.
Fos sibh bhacar sibh, also you, you were hindered.

24. *Tio-esu, Daimheach,* a relative.
Bha esan, he was.
Tha esan, he is.

27. *Virseto avirseto fas est,*
farsuing anfharsuing fas aisde,
From near and from far pour out.
Fearachas so am fearachas so fas aisde.
This manhood growing out of that manhood.

55. *Sevom surur purdovitu,*
Suaip saorsa furtaich-baidh.
In exchange for independence, helpful alliance.
'Se bhuam shaorar furtaichte.
It is from me the assisted men saved.

Mefa spefa,
Meas easba, little respect, disregarding.
fo mi, fo sibh, under me, under you.
By means of me, by means of you.

Table VI. *b.*

Line 5. *Ape sopo postro peperscust.*
a bho sabh bho eadar bibhsaigh siad.

By which they were deprived of mutual help.
fein sheap bho stri a dh-fhabradh cuis, etc.:
He himself went stealthily from the strife to favour the cause, etc.

35. *Sehemo atropusatu.*
Cenomani aithre barc.
The Cenomani repenting desertion.
Cenomani bhatar a putadh,
The Cenomani they were pushing.

47. *Crinca trohatu, gairm gu trei treig,* to summon to withdraw.
crion cath ro bhadar, they were (men) of small fight.

48. *Efrar. Tabhair,*
A bheirear that will be given.

52. *Ehesu—nosne ier ehesu*
ach—an suaip foir ach.
But (the Populonans) who refuse to exchange help.
ach a so nuas bha iad ach a so.
But hereupon down they were, but hereupon.

63. *Simo. Team,* to warn.
Is iomadh. There are many.

Table VII. (*a*)

Line 2. *Atrof, aoibh er ibh,* ye tribes.
abraibh, say ye.

3. *Tiom-plener. daimh-fhlann,* blood relations.
D'am bheilear, to whom there is.
De'm bheilear, of whom there is.

Evidence is furnished by their Tables that the Umbrians were for a long time in possession of their alphabet, whether it was borrowed by them from the Romans or not. The process of phonetic decay from which the Gaelic language has suffered so severely that the orthography is no safe guide to the pronunciation of Gaelic words, had already manifested itself. Thus Anderse, Marte, and Martier represent Ancherse, Marche, Marchier. Had the alphabet been a recent acquisition, it would have been employed phonetically. Happily for the philologist, the Umbrian orthography like that of all the Celtic languages, with the exception of Manx, is historical.

Fortunately the name of the author of the Umbrian inscriptions is given in Tables V. b. and VII. b. He is Herti, King of Umbria, and Suzerain over all the Celtic as well as over many Ligurian tribes from the Rhaetian Alps to the northern border of Umbria, and from the confines of Gaul to Istria. His name contains the root of the well-known word *Arthur*, and corresponds with Art, the name of more than one king in Irish legendary history. There are even some curious coincidences between the story of his Tables and the history of Art Aonfhir, who is said to have reigned in Ireland in the middle of the second century A. D. (Keating, p. 248.)

Table VII. b. ends with the words *sins a ccc.*, which may be interpreted "the 300th year of the age or era." The question at once suggests itself, "Who can tell when the Umbrian era began?" The other Tables mention Marcius Philippus, Valerius Flaccus, L. Porcius Licinus and Hasdrubal, but not as contemporaries: so that our only safe inference must be that the events recorded must have been later than 186 B. C., when Marcus Philippus made his unfortunate campaign in Liguria. (Livy xxxix, 22.)

The Umbrian Tables are rhetorical in the extreme, and abound in repetitions that are apparently unnecessary and indeed useless. Some valuable fragments of history are to be found in the Tables. The enumeration of tribes and peoples is of great importance to the Ethnologist, *e. g.* the three divisions of the Tyrrhenians, the five divisions of the disloyal Perscli, the fourteen tribes of Ijovine, and the five tribes of the Insubres.

Liguria, Cisalpine Gaul and Venetia are the three regions with which the Tables deal. There is much difficulty in identifying the names of the places that are mentioned, as well because the information which can be gathered regarding such places from classical historians and geographers is very meagre, as because the Romans either translated the native Celtic name, or so adapted it that it became significant and euphonious to Latin ears.

Concordia, Patavium, and Verona in Venetia were Celtic settlements, which in the Umbrian Tables were called Andersa, Hebetafeben and Purdin. The well-known cities Cremona and Placentia were in Umbrian, Crabove and Fiso-Sansie. Though, with the changeful circumstances of those old Celtic tribes, the names of places must have disappeared, the Italian topographer may find some of the ancient names still lingering in obscure portions of the region with which the Tables deal.

SUMMARY OF THE UMBRIAN NARRATIVE.

The Perscli, a generic title, embracing most of the tribes of Western Venetia and Transpadana, who did not belong to the Cenomani or to the Insubres, formed the Umbrian army of occupation in those regions. The tribes composing the Perscli appointed the general of the whole army by rotation. When the turn of the Asseriates of Venetia to elect a general came round, they nominated one of themselves who bore the name Parfa. The other tribes were not pleased at the election of Parfa, because they wished to retain their former general, whose name was Appei. The army revolted under Appei, and was favoured in so doing by the city Concordia, which though Celtic in origin, was under the joint jurisdiction of Pisa and Luna. Appei and his insurgents, joined by the Taurisci, Flamonienses, Isarci, Cenomani, and other tribes eager to be free from paying tribute to Herti, sacked Tarvisum in Venetia, which stood in friendly relations to Parfa, as a matter of revenge; and then passing into Transpadana took possession of Tetellus where they established themselves. Encouraged by this revolt, the Insubres who had joined Appei and had doubtless been incited by him, marched southward to the Padus, pursuing the fugitives from Tetellus. Herti, gathering an army in Umbria, marched northward and defeated the ravagers at Brixellum. Nevertheless, the subsequent history shows that a large body of the Insubres still remained in Cispadana, north of the country of the Apuans.

The time was one of general upheaval. The Populonians of Etruria took advantage of it to extend their colonial system, attempting to gain the Apuans and Vicumnians of Liguria and succeeding in detaching from Umbria the Adrians and Fiscaglians of Venetia, and in taking possession of Edro; at the same time inciting the mischievous Concordians to make trouble in the north. One of the tribes most hurtful to Umbrian interests was that of the Triumpilini who dwelt north of Brixia. They endeavoured to withdraw from their allegiance, but with very partial success the Vicumnians, Ticinates, and Boii. However, they succeeded, in withdrawing Brixia and its colony Verona.

The Crabovian tribes, in whose country the Roman colony of Cremona was situated, thought the time favourable for reconquering their ancient seat, and besieging Cremona, called for the aid of the

Triumpilini. The whole of the revolted Perscli, from Eporedia, Brixia, Ateste, and Vicetia, with the Vocontii, who dwelt about Vercellae, responded. Herti summoned the faithful tribes of Ijovine or the race of Feinne, to the relief of Cremona, and apparently succeeded in raising the siege, though in his rhetoric he forgets to state the fact.

Taking advantage of Gallic dissentions, the Genoese of Liguria either took Placentia, or taking possession of the surrounding country, besieged it. Herti, alluding to this result of disunion, summoned the Ticinates and the faithful Fenians to aid him in delivering this city from its invaders. He next turned his attention to Bergomum which was similarly besieged by the rebellious Perscli. Through the loyal Boii, he succeeded in winning back Verona. The people of this city and Vannia endeavoured to get Arnipo,—the Nahepara of the Etruscan Tables, who had been sent from Umbranum in the country of the Boii to quell rebellion in Venetia, but who had himself rebelled—to join them in loyalty. He refused to do so, and going westward tried to incite the people of Comum to deeds of violence. The example of Verona, however, was contagious and many disloyal tribes even among the Perscli and the Cenomani, returned to their allegiance. The original inhabitants of Bononia and the Claternians gave assistance.

Appei made his way towards the Apuan border, and Anovi-himu, the Annovi-gabe of the Etruscan Tables, whom Herti ordered to repel the invasion of Appei, was won over by the rebel general. Thus the Albans were added to Umbria's enemies. Yet Bobium, the Apuans, and the lord of Compiano remained faithful. Herti protected the Ligurian border by the Etruscan forces, and by the Trian tribe about Clastidium. He placed the Anamani in Umbranum to guard the Umbrian border proper, and sent the Umbranians to guard the Venetian border at Patavium. As a reward for their loyalty, he granted independent union to the Anamani, Ædui and Umbranici. In the Table he enumerates fourteen loyal tribes, half of whom seem to have dwelt in Liguria, and the other half in Venetia and Transpadana.

After this,. he turned his attention to Venetia where the Populonians were carrying on war with the aid of the Adrians and Fiscaglians; while the Salluvii, Marici, and Albans in Western Transpadana and Liguria were acting in concert with them. He called Ravenna on the north and the Epanterii of Liguria on the west, to aid him, and commissioned two Vetulonian generals Marte Ijorsi and Honde Serfie, to exterminate the Saluvii and the Marici who were special objects of his hatred. Again, we find him at Sesterno on the borders of Liguria, engaged in expelling the Insubres with the aid of the peoples of Comum and Cameliomagus. The Taurini in Dertona were wavering, but the Inscription ends before the result of his appeal to them can be stated.

The two short Tables VII. b. and V. b. contain, the one an injunction to have no dealings with Appei, with the Taurisci, Populonia and the lord of Concordia; the other, a statement of the tribute, which the Taurisci, Cenomani, Tigurini, Flamonienses and Isarci refused to pay, and of the larger tribute imposed upon them by the new masters.

The Umbrian Tables, therefore, form an historical document, dealing as they do with a very important period and with very important circumstances in the history of that portion of Italy which is embraced by them. From the ethnological and geographical notes which are appended, it can readily be seen, that powerful evidence of a corroborative kind in favour of the interpretation of the Tables which is now advanced, can be gathered from Greek and Latin historians and geographers. An interpretation, then, which presents an important and continuous narrative and which furnishes an intelligible and sufficient reason for the preparation of such Tables at all, is *a priori* to be regarded as more sensible, and as possessed of a much larger measure of verisimilitude than the interpretation which Bréal and others have offered. To contend that words denoting lapwings, and magpies, and ravens, and crows, etc., occur in the Umbrian Tables; to be told that such words as smurrim, tettum, rantim, pertum, etc., are Latin words, while it is clear that if they are Latin words they have the very questionable merit of being original and altogether unintelligible to the ordinary Latin scholar; to be told by Bréal that such interpretations as these are to be put on some of the phrases that occur in the Tables (though no one has elsewhere ever heard of a Fisian Hill, and of deities bearing the designation Die Grabovie, Trebo, Jovio, Marti Grabovie, Fiso Sancio) Die Grabovie piato collen Fisium, sues altiles tres facito Trebo Iovio pro colle Fisio; tres boves facito Marti Grabovie pro colle Fisio, sues lactentes tres facito Fiso sancio pio colle Fisio:—such considerations are of themselves *a priori* not very acceptable, and do not deserve to be regarded as offering a satisfactory explanation of a serious document. The honest contention must be strengthened as it can be, and is, by any amount of cumulative evidence, that such an interpretation as Bréal has advanced, intangible and chimerical in many of its forms and explanations, must be regarded as altogether inferior to the historical interpretation of which a somewhat full summary has been given.

NOTE:—It has not been found possible to print *in extenso* the decipherment of the Umbrian Inscriptions, together with the Geographical and Ethnological notes, that are appended, all of which are in readiness.

GEOLOGICAL AND MINING SECTION.

A Committee of the Geological and Mining Section, consisting of Wm. Hamilton Merritt, F.G.S., Chairman; Archibald Blue, Secretary; Dr. P. H. Bryce, Mr. John Notman and Mr. R. W. Phipps, have made a Report on the Mining Industries of Canada, which states:

1. That as shown by successive annual reports of the Geological Survey, extending over a period of more than forty years, the known mineral resources of our country are a vast and valuable possession. In precious metals there is reason to believe that we have rich occurrences of gold and silver; while in the economic minerals the country is pre-eminently rich in iron, copper, gypsum, apatite and coal. We have also manganese, barytes, antimony, plumbago, asbestus, salt, petroleum, slates, building stone, marbles, limes, cements, mineral pigments and minerals applicable to the fine arts in proved abundance.

The recent discoveries of copper and gold in the vicinity of Sudbury, of new silver lodes in the district of Port Arthur, of anthracite and bituminous coals on the eastern slope of the Rocky Mountains, as well as various new discoveries of gold, silver, lead and coal in the heart of British Columbia, now accessible by means of the Canadian Pacific Railway, encourage the hope that a systematic survey of the country will reveal stores of vast extent and richness, the existence or locality of which is not now suspected.

2. Your Committee have obtained information relating to the mineral and metallurgical products of the United Kingdom of Great Britain and Ireland from the annual reports prepared by Her Majesty's Inspectors of Mines, and to the same in the United States from returns compiled by the "Division of Mining Statistics" of the United States Geological Survey.

From one of the first-mentioned reports a good deal of information has been obtained concerning the trade between the United Kingdom and her colonies, and also the production of the principal colonies.

The data for the tables illustrating the trade between the Dominion and the United Kingdom has been obtained from our Trade and Navigation Returns, and the trade with the United States from the same source, and also from the Commerce and Navigation Returns of the United States.

While these latter tables have been made up to the year 1886, though it is feared more or less imperfectly owing to varying and incorrect returns, much of the trade of Great Britain, both with her colonies and the rest of the world, is from the returns of the year 1883, which was the only report available to your Committee until quite recently, when the returns for 1884 and 1885 were received; but it is found that in the aggregate the variation between the returns for the years 1883 and 1885 is so small, and the work of sifting out the special returns for the colonies (which are not kept separate) so laborious, that it was thought the returns above mentioned would serve every requisite on this occasion. For example, the general summary of the mineral product of the United Kingdom for 1883, was about fifty-six million pounds sterling, for 1884 about sixty-one million pounds sterling, and for 1885 about fifty-eight million pounds sterling.

3. The tables accompanying this report reveal to us at the first glance the small mineral production of Canada, not only in contrast to the United Kingdom, and to our neighbor the United States, but as compared with the other leading colonies.

Taking the figures collected by Her Majesty's Inspectors of Mines for 1884 we have for—

African Colonies	$15,905,181
Asiatic (including India)	5,532,089
Australasia	47,885,069
British North America	6,108,995

The following table makes a brief comparison between ourselves and our neighbors showing the total number of miners employed in both countries and the production of copper, iron and salt in the last census years respectively :—

	Canada. 1880.	United States. 1879.	Ontario. 1880.	Michigan. 1879.
No. of miners...........	6,541	234,228	493	6,978
Copper ore, tons..........	8,177	1,007,490	170	938,960
Iron ore, tons	223,057	7,974,806	91,887	1,837,712
Salt, bbls................	472,000	3,521,221	472,000	2,485,177

In 1886, according to the Report on Minerals in Canada by the Geological Survey, the total value of mineral production vas $10,529,361 (or $11,529,361, errors corrected) while the total value of mineral production in the United States in the same year, according to the Report on Mineral Resources by the Geological Survey of that country, was $459,327,888—being a proportion of about 1 to 40.

Your Committee are emphatically of opinion that this great disproportion does not exist in the mineral resources of the two countries·

4. From Table "A," accompanying this report, it will be seen that for the year 1886, the imports into Canada of mining and crude metallurgical products from the United Kingdom were $6,880,103 and from the United States $9,448,776, while the exports from Canada in the same year to the United Kingdom were $591,632 and to the United States $3,187,163.

The above figures are from the Trade and Navigation Returns of the Dominion. We give a separate table "Aa," compiled from the United States Trade Returns in order to show the remarkable difference there is in the returns of the same article given by the two countries.

In each case there was a balance against us of about six millions of dollars, but it will be borne in mind that the tariff of the United States is in many productions practically prohibitory.

Again, taking Canada's exports ot produce of the mine to Great Britain, the United States and all other countries for the ten fiscal years 1877-1886, we have the following figures :

YEAR.	Great Britain.	United States.	Other Countries.
	$	$	$
1877	1,061,201	2,413,525	169,314
1878	142,374	2,472,979	200,994
1879	265,305	2,636,334	181,261
1880	216,867	2,495,624	164,860
1881	253,652	2,346,529	167,648
1882	311,456	2,418,021	284,096
1883	443,831	2,198,014	329,041
1884	519,672	2,505,501	221,919
1885	485,408	2,898,518	255,611
1886	589,832	3,115,696	245,619
	4,289,598	25,500,741	2,220,363

5 Believing it would be of interest to ascertain the trade of the United Kingdom and of the United States as well as that of Canada with the world at large in minerals and metallurgical products, your Committee have prepared two sets of tables with this in view.

The first set " B " take the exports and imports for the years 1881 to 1884 inclusive. They shew that on the average the values of exports were, from

Great Britain	$228,908,727
The United States	72,500.654
Canada	3,338,231

and that the values of imports were, to

Great Britain	98,801,964
The United States	72,887,652
Canada	24,349,898

The second table " C " treats more fully with the detail and takes into consideration only the crude metallurgical products.

From this we get values of exports of

	United Kingdom.	United States.
Ores	$ 54,149,094	$13,770,477
Metallurgical Product	176,560,594	65,262,079
Total	$230,709,688	$79,032,556

While the values of imports were:

	United Kingdom.	United States.
Ores	$33,512,356	$ 9,033,986
Metallurgical Product	33,433,902	54,775,490
Total	$66,946,258	$63,809,476

The first table shows us that the United Kingdom exports three times as much of minerals and their products as the United States, while she imports one-third more than the United States.

From the second table we gather that the United Kingdom imports about four times as much ore matter as the United States and a little more than one-half the crude metallurgical product.

The imports of ores to the United Kingdom are chiefly copper ores and regulus, silver ore, iron ore, iron pyrites and phosphates, with lesser quantities of ores of lead, manganese and gold; while the United States imports her largest quantities in coal, silver and iron ores and salt, with smaller quantities of clays, copper ores, phosphates and asbestus, and a small quantity of most other economic minerals.

In crude metallurgical productions the United Kingdom imports very large amounts of copper, lead, tin and zinc, while the importation of the United States is chiefly made up of iron and steel, with tin, earthen and China-ware next in importance, and lesser amounts of fertilizers, lead, zinc and marbles.

6. A Table "D" has also been prepared shewing the trade carried on by the United Kingdom with Canada, with her other colonies and also with the rest of the world in mining and crude metallurgical product.

This shews that the colonies do as yet but a small proportion of business compared with that carried on by the United Kingdom with foreign countries, the imports to the United Kingdom in 1883 being:

From Canada	$ 512,471
From Colonies (other than Canada)	8,137,274
From other Countries	58,281,835

While exports from the United Kingdom were:

To Canada	$ 7,765,344
To Colonies (other than Canada)	51,616,930
To other Countries	170,975,358

A.

From Dominion Trade and Navigation Returns.

EXPORTS, 1886.

	VALUE IN DOLLARS.	
	To United Kingdom.	To United States.
	$	$
Coal, bituminous	76,304	1,127,677
Gold	450	1,210,864
Gypsum		112,271
Mineral oil		27,742
Antimony ore	35,320	3,000
Copper ore		291,397
Iron ore		23,039
Manganese ore	29,853	13,001
Silver ore		25,134
Phosphates	407,314	6,817
Plumbago	1,481	
Salt		26,714
Sand and gravel		23,195
Slate		4,256
Stone and marble (unwrought)		59,888
Other articles	40,588	159,670
Gypsum (ground)		18,485
Lime		18,552
Stone and marble (wrought)	328	15,461
	$591,638	$3,187,163

IMPORTS, 1886.

	VALUE IN DOLLARS.	
	From United Kingdom.	From United States.
	$	$
Salt—Bags fine, coarse; bags coarse and bulk	206,262	14,348
Brass—Tubing, bars, strips, wire clots, scrap, sheet and wire	88,625	298,960
Cement—Hydraulic, bulk and bags, and Portland	104,592	15,441
Coal—Anthracite		4,095,966
" Bituminous	199,661	2,527,807
Coke	6,037	37,798
Copper—Bars, rods, scrap, pig, sheet and wire	92,600	132,611
Earthenware	413,223	32,367
China and porcelain	76,859	9,372
Iron and steel—Dutiable and free, including scrap and wire	4,625,841	1,091,986
Lead	149,107	5,439
Marble	3,138	78,575
Britannia metal, type and babbit metal, pewter	12,295	75,226
Asbestos (manufactured)	548	6,283
Mineral substances and ores (not otherwise specified)	5,995	23,882
Plumbago—Raw and manufactured	118	5,663
Mineral oil		421,730
Products of shale, petroleum, etc	1	59,374
Gypsum (manufactured)	2,469	6,034
Diamonds and precious stones—Unset	60,634	15,970
Paint—Fireproof		2,143
Slates	1,060	25,651
Building stone, granite, flagstone and grindstone	16,312	85,513
Tinware and block tin	154,649	190,529
Zincware and block zinc	53,434	16,584
China—Fire, pipe and other clays and chalk	18,690	16,558
Brimstone		2,809
Tin plates	619,971	124,849
Litharge, lime and whiting	35,106	15,446
Nickel and bismuth	70	289
German silver and silver sheets	2	9,981
Sand and gravel		22,692
	$6,880,103	$9,448,776

Aa.

From Commerce and Navigation Returns of the United States.

EXPORTS (TO CANADA), 1886.

ORE OR METAL.	VALUE IN DOLLARS.
	$
Coal—Anthracite	2,564,340
" —Bituminous	751,895
Copper—Ingots, bars, old, sheets and other manufactures	27,080
Copper ore	4,680
Earthen and stoneware	68,310
Chinaware	8,145
Iron—Pig, bar, carwheels, castings, plates and sheets, railroad bars or rails, iron and steel; wire, iron and steel	374,182
Iron ore	1,122
Lime and cement	25,047
Marble and stone, unmanufactured; roofing slate and other manufactures	228,639
Mineral oil—Naphthas, illuminating and lubricating	479,576
Quicksilver	3,666
Salt	4,873
Tin, manufactures of	38,893
Zinc—Pigs, bars, and manufactures of	11,439
	$4,591,887

IMPORTS (FROM CANADA), 1886.

ORE OR METAL.	VALUE IN DOLLARS.
	$
Coal—Bituminous	1,014,116
Copper ore	332,240
Gold bars and bullion	687,705
Silver bullion	1,827
Unspecified mineral substances	3,646
Iron ore	25,731
Stone, slates, etc	92,756
Mineral oil	15,204
Salt	53,317
Phosphates	6,740
Gypsum, unground	115,003
Plumbago	2,405
Precious stones and imitations	65,637
	$2,416,327

B.

EXPORTS OF THE UNITED KINGDOM.

ARTICLES.	1881.	1882.	1883.	1884.
	£	£	£	£
Cement	753,392	804,601	925,474	871,015
Coals	8,785,950	9,564,616	10,645,919	10,851,130
Products of coals (except dyes)	565,693	781,412	1,017,767	1,068,900
Metals:				
Iron, old	488,047	507,161	337,995	223,422
Iron, pig & puddled	4,104,776	4,962,185	4,077,456	2,945,223
Iron, bar, angle, etc.	2,013,133	2,298,533	2,034,667	1,942,294
Iron, railroad	5,666,446	6,387,219	6,014,264	4,142,063
Iron, wire	1,000,844	1,330,544	926,797	692,607
Iron, hoops, sheets, and boiler plates	3,404,790	3,943,806	3,899,774	3,693,001
Iron, tinned plates	4,163,132	4,642,125	4,705,403	4,746,923
Iron, cast or wrou't, and all other mfrs.	3,964,268	4,549,860	4,616,660	4,580,671
Steel, unwrought	1,871,161	2,034,339	1,396,556	1,127,481
Steel, mfrs. of	914,311	942,534	580,644	402,380
Telegraph wire	1,983,663	1,042,561	1,237,893	2,509,153
Copper, unwrought:				
Ingots, cakes or slabs	1,228,378	909,241	1,143,034	1,053,135
Wrought or prtly. w	2,208,189	2,424,837	2,426,439	2,513,894
Brass, of all sorts	384,792	444,383	432,033	452,998
Lead, pig, sheet and pipe	675,828	577,325	533,144	422,178
Tin, unwrought	460,506	579,557	524,049	469,210
Zinc, wrought and unwrought	118,296	125,969	98,741	100,356
Salt	585,838	568,715	645,009	611,537
Totals	£45,341,433	49,421,523	48,219,718	45,419,571
	= $220,359,364	240,188,602	234,347,829	220,739,115

IMPORTS OF THE UNITED KINGDOM.

ARTICLES.	1881.	1882.	1883	1884.
Metals:	£	£	£	£
Copper ore & regulus	2,427,761	2,609,836	2,936,208	3,175,066
Unwrought, p't w'rt and old copper...	2,166,383	2,522,393	2,413,793	2,329,175
Iron ore...........	2,349,411	3,063,091	2,750,870	2,114,600
Iron in bars..	1,140,509	1,396,457	1,236,735	1,165,948
Iron and steel, wro't or manufactured..	2,564,823	2,474,898	2,870,813	2,693,422
Lead, pig and sheet.	1,388,109	1,266,999	1,305,388	1,222,325
Silver ore....	688,176	750,079	1,030,542	1,089,768
Tin in blocks, ingots, bars or slabs.....	1,873,472	2,538,577	2,442,959	2,123,799
Zinc, crude in cakes	755,666	708,877	640,302	700,154
Zinc, manufactures.	414,813	396,936	408,206	390,157
Petroleum.....	1,952,444	1,721,019	2,170,298	1.711,313
Pyrites, iron or copper	1,202,281	1,422,684	1,356,083	1,244,871
Totals.........	£18,923,848	20,871,846	21,562,197	19,660,598
	= $91,969,901	101,437,171	104,792,277	97,008,506

B.

EXPORTS OF THE UNITED STATES.

ARTICLES.	1881.	1882.	1883.	1884.
	$	$	$	$
Brass and mnfrs. of...	216,057	322,439	287,847	301.014
Coal—Anthracite... .	2,091,928	2,589,887	2,648,033	3,053,550
" —Bituminous....	739,532	1,102,898	1,593,214	1,977,959
Copper and mnfrs. of.	876,395	748,456	2,348,004	5,595,859
Iron and steel and manufactures of *...	16,608,767	17,551,322	140,427 19,024,894	18,369,148
Lead and mnfrs. of..	39,710	178,779	43,108	125,156
Marble and stone and manufactures of. ..	629,795	614,430	541,553	503,260
Mineral oils..........	40,315,609	51,232,706	44,913,079	47,103,248
Quicksilver..........	1,124,955	959,128	1,020,827	427,219
Salt	14,752	18,265	17,321	26,007
Tin and mnfrs. of....	198,524	198,608	191,947	166,819
Zinc and mnfrs. of...	148,212	138,374	82,490	31,107
Totals	$63,004,236	$75,655,292	$73,652,744	$77,690,346

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* Sewing machines and agricultural implements not included.

IMPORTS OF THE UNITED STATES.

ARTICLES.	1881.	1882.	1883.	1884.
	$	$	$	$
Brass and mnfrs. of...	494,249	668,136	570,666	470,435
Coal and coke.. ...	2,008,967	2,192,689	2,084,151	2,589,958
Copper and mnfrs. of.	564,923	317,172	191,285	291,603
Iron and steel & mfrs. of (including ore)...	51,454,574	53,898,267	40,837,376	42,917,747
Lead and mnfrs. of...	163,742	211,935	170,198	92,861
Marble and stone and manufactures of....	749,763	798,542	819,567	950,217
Metals and mnfrs. of, not elsewh'r specif'd	1,162,913	1,429,918	1,489,445	2,248,814
Mineral oils and other mineral substances..	112,152	187,248	141,532	89,154
Platinum............	294,635	334,183	391,766	373,110
Salt	1,900,610	1,561,132	1,476,946	1,527,455
Slate and mnfrs. of...	46,864	45,928	49,919	
Tin and mnfrs. of....	18,685,903	21,838,261	22,903,572	5,482,909
Zinc and mnfrs. of...	262,218	949,041	802,933	251,476
Totals..........	$77,901,513	$84,432,452	$71,929,356	$57,285,739

B.

EXPORTS OF CANADA.

ARTICLES.	1881.	1882.	1883.	1884.
	$	$	$	$
Coal................	1,123,091	1,078,704	1,087,411	1,201,172
Gold................	767,318	930,951	911,383	952,131
Gypsum, ground and unground.........	132,787	138,180	160,794	172,928
Lime	....	....	....	....
Mineral oils..........	631	136	368	7,546
Antimony ore........	3,921	4,733	11,842	4,855
Copper ore..........	150,412	139,245	150,479	214,044
Iron ore and products of iron and steel....	445,707	571,700	556,100	354,667
Manganese..	38,738	37,485	29,417	15,851
Silver	34,494	15,110	14,200	12,920
Phosphates..........	239,493	327,667	302,716	453,322
Salt.................	39,566	36,418	17,511	17,408
Sand and gravel......	12,511	13,789	17,755	14,152
Stone, marble & slate, wrought & unwrou't	95,726	115,167	94,880	82,392
Total............	$3,084,395	$3,409,285	$3,354,856	$3,504,388

Imports of Canada.

Articles.	1881.	1882.	1883.	1884.
	$	$	$	$
Brass and mnfrs of.. .	276,958	362,581	383,106	393,544
Coal	4,094,294	4,696,007	6,389,804	7,503,871
Copper and mnfrs of..	160,329	222,219	243,222	235,510
Gold and silver and mnfrs. of.........	233,806	333,820	345,515	230,614
Iron and steel and mnfrs. of *...... .	12,224,180	16,378,344	18,253,179	13,464,742
Lead and mnfrs. of...	150,292	181,354	203,100	166,804
Marble, slate and stone and mnfrs. of... ..	220,323	236,440	265,491	265,594
Metal, composition and other..............	368,967	462,286	649,236	611,909
Oils, mineral.........	280,638	453,250	460,728	427,641
Salt................	494,633	323,807	422,367	360,192
Zinc and mnfrs. of...	126,469	99,736	22,599	99,742
Tin and mnfrs. of....	413,924	946,522	1,258,136	1,001,769
Total............	$19,044,813	$24,696,366	$28,896,483	$24,761,932

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* Not including sewing machines and agricultural implements.

C.

ORES.	EXPORTS.		IMPORTS.	
	From United Kingdom, 1883.	From United States, 1886.	To United Kingdom, 1883.	To United States, 1886.
	$	$	$	$
Clays, except ordinary	935,404	9,978		225,323
Coal, anthracite		2,707,590		20,140
" bituminous	51,739,166	1,480,940		2,551,954
Coke		18,327		
Cobalt and nickel ore and matter		11,687		
Copper ore & regulus		3,068,879	2,387,926	417,449
Gold ore		34,160	21,384	1,397
Silver ore			5,008,434	1,263,257
Iron ore		144,652	13,369,228	1,306,033
Iron pyrites, chiefly cuprous			6,590,563	
Lead ore	16,524		983,129	
Manganese ore			496,217	
Phosphates			3,955,189	426,243
Quicksilver		219,259		
Salt	1,458,000	29,827		1,499,182
Tin ore			3,474	
Zinc ore		24,951	696,812	
Mineral oil, crude		5,859,577		15,581
Marble and stone, unmanufactured		159,553		
Platinum				356,041
Plumbago				164,111
Aluminum				5,298
Bismuth				117,768
Gypsum				116,202
Buhr stones, unmnfd.				40,772
Lithographic stone				73,884
Mica		897		43,107
Charcoal				35,544
Emery				83,214
Pumice				30,128
Talc				25,394
Mineral subs, not elsewhere specified				123,864
Asbestos, crude				91,089
Total ores	$54,149,094	$13,770,477	$33,512,356	$9,033,986

C.

METALS.	EXPORTS.		IMPORTS.	
	From United Kingdom, 1883.	From United States, 1886.	To United Kingdom, 1883.	To United States, 1886.
	$	$	$	$
Brass and mnfrs. of		150,807		404,678
Bronze and mnfrs. of				714,473
Cement		123,103		722,576
Asbestos, mnfd		29,303		
Copper, unwrought, partly wrought, pigs, bars and sheets	23,660,224	2,498,898	8,679,717	57,651
Copper, mnfrs. of	45,527	108,975	362,293	122,985
Earthen, stone and chinaware		163,908		4,947,621
Fertilizers		1,107.657		1,680,473
Iron Pig				4,041,366
Mfrs. of iron and steel..	138,948,439	15,745,569		33,278,088
Lead, pig, mnfrs. of..	2,765,937	114,098	7,423,354	865,820
Lime				41,107
Mineral oil Refined..		44,340,267		
residuum				
Slates	1,216,098	605,261		
Terra alba, etc				25,878
Tin plates				
Plaster Paris, ground and calcined				38,852
Tin, bars, blocks or pig	9,042,163		11,872,790	5,873,752
Tin, mnfrs. of		157,724		
Marble and stone and mnfrs. of				872,036
Zinc, blocks and pig..	882,206	64,410	5,095,748	119,425
Zinc, mnfrs of		12,749		49,406
Nickel, mnfrs. of		35,302		
Platinum, mnfrs. of..		4,048		
Other metals, metal compts & mnfrs, not elsewhere specified				1,920,103
Total metals	$176,560,594	$65,262,079	$33,433,902	$54,775,490
Total ores (carried forward)	54,149,094	13,770,477	33,512,356	9,033,986
	$230,709,688	$79,032,556	$66,946,258	$63,809,476

D.

From Report H. M. Inspectors of Mines, 1883.

ARTICLES.	EXPORTS FROM UNITED KINGDOM.			IMPORTS TO UNITED KINGDOM.		
	To Canada.	To Colonies, (other than Canada.)	To Other Countries	From Canada.	From Colonies, (other than Canada).	From Other Countries
Clays (except ordinary)			$ 935,404			
Coal	$397,445	$7,490,270	43,851,449			
Copper, unwrought, wrought, yellow metal and manufactures	266,814	8,241,082	15,152,347		2,316,276	6,725,734
Copper ore				and Newfld. 166,909	354,425	1,851,834
Iron ore			38,014			13,369,228
Iron—Pig, bar, angle, bolt, rod, railroad, Tin plates and sheets, hoops, sheets and boiler plate, wire (except telegraph), cast and wrought, steel, unwrought, iron and steel combined	6,735,474	33,705,135	98,507,840			
Lead—Pig, rolled sheet, piping and tubing	145,493	1,093,014	1,527,629			7,423,354
Lead ore			16,524		96,665	886,464
Salt	120,712	400,566	930,131			
Slates		104,762	1,111,336			
Tin	98,726	31,794	8,573,465		5,022,285	6,850,505
Tin ore					3,474	
Zinc	680	550,307	331 219			5,095,748
Zinc ore					208	696,604
Gold ore						21,384
Iron pyrites						6,590,563
Manganese ore (1882)				21,252	24,951	450,014
Phosphates				324,230	278,473	3,352,486
Silver ore					40,517	4,967,917
Total	$7,765,344	$51,616,930	$170,975,358	$512,471	$8,137,274	$58,281,835

SNAKE POISONS.

ABSTRACT OF PAPER READ BEFORE THE CANADIAN INSTITUTE BY DR. J. H. GARNIER, NOVEMBER 5TH, 1887.

Snake poisons have riveted the attention of mankind from the earliest ages, and the Hindoos likely used snakestones even before the first historical mention of men. Snake charming is a profession in all the Indo Malay countries as well as Hindostan proper, and the secrets of their profession are carefully handed down from father to son. All things go by caste in that country and the secrets of a profession never are allowed to pass out of the family and its proper descendants. In North America there are three well marked varieties of poisoning; first, by the Colubrine snake, "elaps fulvias" and the local varieties of it that exist in various regions of the Southern States; second, by the Copper head and Cotton mouth, Ancistrodon Contortrix and Ancistrodon Piscivorus. thirdly, by the true rattlers. In Canada there may be two or three species, but they are now becoming very scarce. The only variety in Ontario is the little prairie rattle snake or Massissauga, the Caudisoma Tergemina of Baird and Girard. The symptoms of the bite of rattlesnakes, are extreme pain in the bite, yet with a dead or numb-feeling; swelling of the adjacent regions; rapidity of pulse; laborious breathing; congestion of the lungs; spitting blood or rusty sputa; then gradual syncope and failing pulse; extreme drowsines; faintings and death. The poison is absorbed from the bite, and disseminated through the entire body, blood, nerves, veins, arteries and every tissue is affected.

We need a remedy that will follow this death dealing poison into every cranny and corner of the system, and neutralize it the moment they meet, there and then. Such a remedy I propose to lay before you to-night, and from the extreme ease of giving it and as, both portions of it being easily procured, it is at everybody's command, I hope sincerely it may be given a fair and honest trial. The ingredients are first Iodide of Potash say one dram to be taken in two ounces or more of cold water, tea, coffee or any similar fluid. Then let it have about ten minutes to get absorbed into the blood and circulation. It is very rapidly passed through the coats of the stomach into the circulation and system. This had best be repeated twice to make sure and have the entire system impregnated. Then use an incompatible or another substance that at once resolves the iodide into its elements, and sets the iodine free. Sweet spirits of Nitre does so. Give an ounce in water or mucilage or syrup of any sort. It is far best to give a large dose and make sure. The Nitric Ether is even more rapidly absorbed than the iodide of potash and the instant they meet in solution the iodine is freed and at once attacks and neutralizes the venom.

I had received a large jar from India, with many poisonous snakes, and the jar was broken on its route, the snakes consequently on arrival were withered and dried. These were placed with the heads down in a large vase and a quart of water and a pint of proof spirit poured over the heads to soften them. In the vase were two gnans Hamadryas Elaps, (Cantor). These are the most deadly of the cobra family, and the largest. The first was 9 feet 1 inch, the smaller 7 feet 8 inches. This herculean cobra fears nothing and flies from nothing. Mr. Theobald mentions a case of an adult young male elephant that was struck between the eyes by a large gnan, and died in three hours and of a snake charmer who was bit in the wrist and died in a few minutes. The reason of dwelling on this species will be seen on reviewing my own personal case, and I do not wish to endure such extreme agony again.

There were two adult cobras, one sixty and the other fifty-six inches long.

One Trimesurus Carinatus half-grown eighteen inches long.

Two Echis Carinata, one adult sixteen inches, the other twelve and half inches very deadly from Bushere, in Persia.

Two Bungarus Fasciatus, one five feet four a grand specimen, and a smaller twenty-nine inches but large enough to kill anybody.

Three Bungarus Cœruleus—the Krait, adults forty-four, forty-three and thirty-six inches respectively.

Two Daboia Russellii, the famous Tic Polonga killed in the Botanic gardens of Calcutta, thirty-seven and thirty-four inches long, about half-grown.

It is a well established fact, that snake poisons lose nothing of their virulence by the addition of water or spirit though a rather larger quantity is required to be injected to kill.

What came from all these heads was comparatively small of necessity, but even a small portion of it produced the symptoms of this terrific poison as I found to my cost. In February, 1883, I read a paper before the Institute, "On the poisonous snakes of North America," pointing out in theory the use of iodine as a remedy and little deemed I should be personally the first on whom it was to be tested.

After the above mentioned snakes heads had been duly softened I very cautiously manipulated them, opening their mouths and examining the fangs with a powerful hand glass. Previously, that morning in lifting a stove-stick I received a small abrasion and some slight scratches on the ring finger of my right hand. I worked away among this fluid for about three hours, the abrasions being constantly immersed, and at first smarted a little, but this soon subsided, and I continued my investigations and my notes. I then drove into the country for a couple of hours and was unconscious of any pains or annoyance whatever from the poison. About six in the evening there was a dead numbness and great pain in the ring finger and all up my arm, but I took little notice of it. At no time did it extend above the shoulder. Then I became dizzy and squeamish, but these symptoms were transient, but the pain and numbness were continual and persistent and I asked myself what had produced it. I was asked if I had got my arm hurt? No, I had not.

Were you working with strychnine or other poisons? No, I was not. What were you doing with the snakes' venomous heads? Has that caused it? No. Yes! Yes perhaps. I felt very heavy. I belittled the matter but felt truly alarmed. I then mixed a dram of iodide of potash in two ounces of cinnamon water and swallowed it. In ten minutes I did so again. Then in a few minutes more I took an ounce of spirit of nitre in water and mucilage and a glass of whisky. The relief was very rapid and I cannot have been mistaken in attributing the quick relief to the remedy I took. It was no fancy. It was a fact. I took some more whisky and a little after nine o'clock I took a glass of strong brandy punch and went to bed. The pain decreased but my arm felt as if recovering from a heavy blow. I began to perspire and soon fell asleep. Next morning I was nearly all better, and in a few days I was quite well.

In snake bites a deal depends as to deadliness, on the size and species of snake, the season of the year, autumn and extremely hot weather being worst, and the part bitten. A bite in the throat, an artery or vein being worst, then the extremities and glandular portions etc. Dr. Jefferies, of Cain City, near Elsworth, Kansas, was requested by me to try my plan and gave me three cases in which he was most successful. He says, "The first was the case of a young farmer, aged nineteen, Mr. Sweicher, who was bitten on the left foot by a large rattesnake on September 23d, 1884. I saw him two hours and a half after as he had to drive fifteen miles. The foot was much swelled with intense pain up the leg. I gave him a glass of whisky. Then one dram iodide of potash in rose water. In ten minutes I gave him an ounce spirit ether nitre. I repeated these doses three times, and gave him several doses of whisky. He was at once wonderfully relieved, and feeling greatly better soon went away. On leaving I gave him a mixture of iodide of potash three drams to an eight ounce mixture, and directed a desert-spoonful thrice a day. He went to Southern Kentucky for a time and thoroughly recovered and used no other remedy, nor had he the recurrent symptoms.

The second was the case of Mr. Labrodaire, aged thirty-five. On May 9th, 1887, was bitten by a rattlesnake, just above the ankle. I saw him about an hour after the accident. He was weak, pulse 112, face anxious and livid, ankle swelled, and great pain extending into the leg and up the thigh. I at once gave him a drachm and a half of iodide in solution, and in ten minutes half an ounce of sweet spirit of nitre. I also gave about three ounces of brandy. I repeated this treatment for an hour and a half, but I greatly reduced the doses every twenty-five minutes, and gave a little more brandy. He was at once relieved, indeed astonishing so, and on his going I prescribed for him, Iodide Potash, 4 drams; Fluid Extract of Sarsaparilla, 2 ounces; Carbolic Acid, 20 drops; Rose water to 8 ounces, mix and direct a tea-spoonful three or four times a day. He quickly recovered and never experienced any recurrent troubles to any amount.

But the most notable case was of a valuable collie dog which was the property of a Mr. Burt, who lived two miles from my office. He was ploughing and saw a large rattlesnake strike his dog in the leg. He at once unhitched, put his horses to his waggon and brought his dog to me in it. He was most anxious about his dog. I gave the animal two drams of iodide in solution and had some difficulty in getting it down his throat. In ten minutes I gave him an ounce of sweet spirit of nitre. We then went into the office intending to repeat the dose diminished, in half a hour or so, and left the dog in the waggon. I had little faith in any remedy in this case, as the creature was greatly paralyzed and exhibited great suffering. His life was ebbing fast and he seemed to be dying, with no hope of recovery. Mr. Burt was very sorry and did not wish to see his faithful dog die, in agony, in the waggon. In half a hour we intended to repeat the dose and then went out to do so. But you may guess at our astonishment when we found that our canine patient had disappeared, where we could not tell, and we searched and whistled for him in vain. Mr. Burt and myself were puzzled, and he was anxious and started for home. On arriving he was more astonished still to find that the dog had arrived first, and was quietly awaiting his master's return. He came to my office next day, and informed me, the dog was alive and doing well, and was tied up for a few days that he might have a perfect recovery and rest. When I reflect on the prostrated condition he was in on arrival, and knew for a fact, that he had received a full dose of poison from the fangs of a large rattlesnake, I cannot but express the greatest amazement, at the almost miraculous rapidity, with which this seemingly simple remedy acted. "Dr." said Mr. Burt to me, "that dog is worth hundreds of dollars to me, as he does two or three men's work, in herding my cattle."

This animal throughly recovered and seemingly had none of the paralysis and pain, so often left as a souvenir of rattlesnakes' bites, both to man and beast.

I have had other minor cases but these are the most noteworthy, and in all cases the iodide of potash given first and then followed in ten minutes by the spirit aether nitre has been eminently successful. Judging then, by my own experience, I believe if your method of treatment is carried out, in cases similar to these that a failure is impossible and that a speedy restoration will always follow.

(Signed) B. Grant Jefferies, M.D."

I am not the first to point out iodine as a cure for snake bites, as twenty-five years ago Mr. Viaud Marais did so, but he used metallic iodine and failed.

Snake bites cannot well be tested in Canada except foreign poisonous snakes be procured for this purpose. But trivial dependence can be placed on experiments on dogs and other animals. We need positive trials on the human subject and nobody will voluntarily undergo such a test.

But it would be an easy matter for the executive authorities to sanction such an ordeal, and have it carried to completion on the human body without annoying the feelings of the most sympathetic. Are there not very many persons yearly condemned to death, all over the world? What good is obtained for society by hanging or guillotining these miscreants? They have forfeited the sympathies of mankind, and are, so to speak, beyond the human pale. Why not utilize such desperadoes in the causes of science? In testing the efficacy of this, so far, seeming cure, in a legitimate manner on the carcase of a murderer, it should outrage nobody's feelings and humanity heeds little the distorted sympathy of a foolish crank. If all mankind be benefited and a remedy for snake poisons proved effectual by this means, even though a miscreant be sacrificed in the trial, such a life already condemned to be extinguished, is little to be regarded. I most unhesitatingly assert that if the bodies of parties who had forfeited their lives, were employed for scientific research, it would be a grand step in the march of civilization, a step in moral improvement, and must tend to the elucidation of our knowledge in the treatment of very many obscure diseases. Is it not fit that a few cast-aways should suffer to save the living masses of society?

Other assistants to the treatment here presented are snakestones and ligatures.

Snakestones are applied at once to the puncture made by the fang of the snake and adhere and draw out the poison, and as soon as they become filled drop off and hold the venom so extracted; they are then thrown into milk or water and the venom swims on the top. Milk is the better to use, as the poison turns green and is easily seen. I recommend a cut to be made over the puncture and several folds of blotting paper to be introduced, so as to suck up the serum and poison at once. Absorbing cotton or any similar article is always readily obtained.

Ligatures delay circulation and absorption and give more time for action, and thus help. Nevertheless ligatures alone, no matter how tightly applied, do not prevent the poison getting into the circulation and causing death. But in case of a finger or toe being bitten, amputate at once. It is the King of all cures. In case it is practicable cut out the part bitten at once and delay no time.

Next to the knife I certainly think the iodide of potash and followed in a few minutes by sweet spirit of nitre, is the best remedy we have. In all cases whisky and spirits are a very great help. If a person is truly under the influence of snake poison, it is scarcely possible to make him drunk.

A most careful series of researches have yet to be made on the action of snake venom on the blood, on the nerves, on the muscular coats of the arteries, and veins, and the tissues, and glands. This must be done in the near future, and every part be brought upon the field of the microscope.

If Iodine be a remedy in general for snake bites and their venom which I am strongly led to believe, then I think I have pointed out a scientific mode of distinguishing it, when bona fide in circulation. It will be admitted that my own case, and the cases stated by Dr. Jefferies bear a powerful evidence in its favor that none can lightly cast aside. Be it the iodine, be it the nitrate of potash or the the spirits, mixing in the blood, and reacting on this venom and poison in the serum, fibres or blood-corpuscles, there seems little doubt that the action and destructive energy of this venom on human or animal life is quickly stayed and the subsequent recurrent and most distressing symptoms are greatly alleviated. I claim no specific for snake bites in this my treatment, as I know full well that such a claim is futile "*just now,*" but I do claim that it is well worthy of a fair and honest trial, and if it prove a success in treating such deplorable and terrible accidents, I shall feel heartily glad to know that I have been of some use to my fellow men.

INDEX OF AUTHORS.

PAGE.
Bailey, Bruce 213
Baker, Alfred, M.A. 194
Browning, T. B., M.A. 132
Bryce, Dr. P. H. 149
Chamberlain, A. F., B.A. 57, 144
Creelman, W. F. W., B.A. 14
Dale, T. Nelson, M.A. 145
Douglass, W. A., B.A. 136
Dunlop, Prof. 130
Ellis, W. H., M.A., M.B., 123
Ferguson, Rev. Prof. 84
Fessenden, C., B.A. 27
Garnier, Dr. J. H. 218, 255
Görgenyi, Arthur, 105
Houston, W., M.A. 25
Ives, James T. B., F.G.S. 125, 185
Kelso, J. J. 142
Laboureau, Rev. Father, 149
Lawson, A. C., M.A. 173
Livingston, J. A., 145
Merritt, W. H., F. G. S 240
Macallum, A. B., B.A. 124, 146, 192
McGill, A., B.A., B.Sc. 39, 212
McKellar, Hon. A. 193
McLean, Rev. John, M.A. 20, 215
MacNish, Rev. N., B.D., LL.D. 76, 219
Nesbitt, Dr. W. B., 163
Notman, John 197
O'Sullivan, D. A., D.C.L. 44
Panton, Prof. J. Hoyes, M.A. 150
Payne, F. F. 111
Phillips, John 145
Richardson, C. Gordon, 133
Rosebrugh, Dr. A. M., 106, 192
Scadding, Rev. H., D.D. 132
Shutt, F. T., M.A., F.C.S. 30
Stupart, R. F. 111
Sullivan, Dion C., LL. B 193
Tout, Charles Hill, 165
VanderSmissen, W. H., M.A 2, 206
Williams, J. B., 193
Wilson, Dr. Daniel 124
Wood, H. R., B.A 56

INDEX TO PAPERS, &c.

PAGE.
Admixtures, Tartaric Acid in 212
Alaskan Boundary 132
American Languages, Relationship of 57
Annual Report, Thirty-eighth 206
Antagonism of Social Forces 136
Apatite, Canadian 30
Astronomy, Notes on 145
Barometric Pressures 111
Beerworts, Dextrine-Maltose in 133
Blackfeet Indians, Mortuary Customs of 20
Blowpipe Analysis, Contributions to 56
Bragh or Stone Flour Mill, a 193
Brittany, Language and Literature of 76
Butter-fat, Identification of 39
Canada in Sculpture 132
Canada, Mining Industries of 240
Canadian Apatite 30
Canadian Woodpeckers 193
Centrifugal Forces of the Planets 145
Chemistry of the Natural Waters of Ontario 123
Coleoptera Collected in Kicking Horse Pass 213
Contributions to Blowpipe Analysis 56
Corea 105
Dextrine-Maltose in Beerworts 133
Diabase Dykes of Rainy Lake 173
Diphtheria 149
Duplex Telephony 106
Ethnology Prehistoric 144
Etruscan Question 84
Experiments in Probabilities 194
Fortuitous Events 193
Fundus Oculi, Photographing the Living 192
Geology in the Public Schools 125
Greylock, Geology of Mount 145
Haemoglobin, Origin of 192
Heredity, Theories of 124
Huron Missions, Reminiscences of the 149
Indian Languages and Literature 215
Insanity, Jurisprudence of 44
Iron and Other Ores of Ontario 185

Lake St. John, Some Stone Implements from . . . 124
Language, Study of . . . 165
Mammals and Birds of Prince of Wales Sound . . . 111
Materia Medica, Volumetric System in . . . 163
Medicine Hat . . . 150
Menobranchus, a New . . . 218
Mining Industries of Canada . . . 240
Mortuary Customs of the Blackfeet Indians . . . 20
Natural Waters of Ontario, Chemistry of the . . . 123
Paper, Manufacture of . . . 197
Pathological Growths . . . 146
Physiology and Psychology . . . 14
Planimeter, a New . . . 27
President's Address . . . 2
Prince of Wales Sound, Mammals and Birds of . . . 111
Public Schools, Geology in the . . . 125
Quichua Language . . . 130
Reichert's Distillation Process . . . 39
Report, Thirty-eighth Annual . . . 206
Snake Poisons . . . 255
Society for Prevention of Cruelty . . . 142
Sociology, Claims of . . . 25
Tartaric Acid in Admixtures . . . 212
Telephony, Duplex . . . 106
Theories of Heredity . . . 124
Umbria Capta . . . 219
Volumetric System in Materia Medica . . . 163
Woodpeckers, Canadian . . . 193

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THE CANADIAN INSTITUTE

Exchanges with the following Societies and Periodicals:

I.—AMERICA.

(1.)—CANADA.

Canadian Practitioner	Toronto.
Canadian Architect and Builder	“
Medical Science	“
Meteorological Reports	“
Public Library	“
Education Department	“
Provincial Board of Health	“
Publications of the Provincial Government	“
Geological and Natural History Survey of Canada	Ottawa.
Parliamentary Library	“
Royal Society of Canada	“
Ottawa Field Naturalists' Club	“
Entomological Society of Ontario	London.
Hamilton Association	Hamilton.
Natural History Society of Montreal	Montreal.
Canada Medical and Surgical Journal	“
Canadian Society of Civil Engineers	“
Celtic Society of Montreal	“
Literary and Historical Society of Quebec	Quebec.
Le Naturaliste Canadien	Cap Rouge, Que.
Natural History Society of New Brunswick	St. John, N. B.
Nova Scotia Historical Society	Halifax, N. S.
Nova Scotia Institute of Natural Sciences	“
Manitoba Historical and Scientific Society	Winnipeg, Man.

—24.

(2.)—UNITED STATES.

Bureau of Steam Engineering, Navy Department	Washington, D.C.
Smithsonian Institution	“
Bureau of Ethnology	“
Bureau of Education	“
Bureau of Statistics	“
Surgeon-General, War Department	“
General Weather Service of United States	“
United States Geological Survey	“
Philosophical Society of Washington	“
United States Coast and Geodetic Survey	“

United States National Museum	Washington, D.C.
Department of Agriculture	"
Anthropological Society of Washington	"
Biological Society of Washington	"
California Academy of Science	San Francisco, Cal
Technical Society of the Pacific Coast	"
Western Scientist	San Diego, Cal.
Colorado Scientific Society	Denver.
Bridgeport Scientific Society	Bridgeport, Conn.
American Journal of Science	N. Haven, Conn.
Connecticut Academy of Arts and Science	"
Yale College Observatory	"
Georgia Historical Society	Savannah, Ga.
Chicago Historical Society	Chicago.
Illinois State Laboratory of Natural History	Champaign, Ill.
American Antiquarian and Oriental Journal	Chicago, Ill.
Brookville Society of Natural History	Brookville, Ind.
Indiana Historical Society	Indiana.
Academy of Natural Sciences	Davenport, Iowa.
State Historical Society of Iowa	Iowa City.
Kansas Historical Society	Topeka.
Kansas Academy of Science	"
Washburn College Laboratory of Natural History	"
Academy of Natural Sciences	New Orleans, La.
Peabody Institute	Baltimore, Md.
Johns Hopkins University	"
United States Naval Institute	Annapolis, Md.
Boston Society of Natural History	Boston, Mass.
American Academy of Arts and Sciences	"
Observatory of Harvard College	Cambridge, Mass.
Harvard University Library	"
Quarterly Journal of Economics, Harvard University	"
Museum of Comparative Zoölogy at Harvard College	"
Peabody Museum of Archaeology and Ethnology	"
American Association for the Advancement of Science	"
American Society for Psychical Research	"
Cambridge Entomological Club	"
Essex Institute	Salem, Mass.
Peabody Academy of Science	"
American Antiquarian Society	Worcester, Mass.
Worcester Society of Antiquity	"
Agricultural College	near Lansing, Mich.
Academy of Natural Sciences	Minneapolis.
Geological and Natural History Survey of Minnesota	"
Academy of Sciences	St. Louis, Mo.

Missouri Historical Society	St. Louis, Mo.
Sedalia Natural History Society	Sedalia, Mo.
Nebraska State Historical Society	Lincoln, Neb.
New Jersey Historical Society	Newark, N.J.
E. M. Museum of Geology and Archæology, Princeton College.	Princeton, N.J.
New York Academy of Sciences	New York.
American Museum of Natural History, Central Park	"
American Society of Civil Engineers	"
Journal of Speculative Philosophy	"
Journal of Comparative Medicine and Surgery	"
Linnean Society of New York	"
New York Microscopical Society	"
School of Mines Quarterly, Columbia College	"
Magazine of American History	"
American Geographical Society	"
New York Academy of Anthropology	"
American Chemical Society	"
Electrical Review	"
Electrician and Electrical Engineer	"
Association of Engineering Societies	"
American Institute of Mining Engineers	"
Political Science Quarterly	"
"Christian Thought"	"
New York State Library	Albany, N.Y.
New York State Museum of Natural History	"
Buffalo Society of Natural Sciences	Buffalo, N.Y.
Buffalo Historical Society	"
Cornell University	Ithaca, N.Y.
Vassar Brothers Institute	Poughkeepsie, N.Y.
Oneida Historical Society	Utica, N.Y.
Rensselaer Society of Engineers	Troy, N.Y.
Elisha Mitchell Scientific Society	University of North Carolina.
Ohio Mechanics' Institute	Cincinnati, O.
Historical and Philosophical Society of Ohio	"
Cincinnati Society of Natural History	"
Magazine of Western History	Cleveland, O.
Denison University, Laboratories of Biology and Natural History	Granville, O.
State Geological Survey of Ohio	Columbus, O.
University of Pennsylvania	Philadelphia.
American Catholic Quarterly Review	"
American Naturalist	"
American Philosophical Society	"
Academy of Natural Sciences of Philadelphia	"
Wagner Free Institute of Science of Philadelphia	"

Franklin Institute of the State of Pennsylvania	Philadelphia.	
Historical Society of the State of Pennsylvania	"	
American Catholic Historical Society of Philadelphia	"	
Wyoming Historical and Geographical Society	Wilkesbarre, Pa.	
Rhode Island Historical Society	Providence, R.I.	
Newport Natural History Society	Newport, R.I.	
University of Virginia	Charlottesville.	
Tennessee Agricultural Experiment Station	Knoxville.	
Wisconsin Academy of Science, Arts and Letters	Madison.	
State Historical Society of Wisconsin	"	—109.

(3.)—MEXICO.

Museo Nacional de México	México.	
Sociedad Cientifica, "Antonio Alzate"	"	
Sociedad Mexicana de Geografica y Estadisca	"	—3.

(4.)—CUBA.

Sociedad Antropologica de la Isla de Cuba	Habana.	—1.

(5.)—SOUTH AMERICA.

Instituto Historico, Geographico, e Ethnographico do Brazil	Rio de Janeiro.	
Annaes da Escola de Minas de Ouro Preto	"	
Sociedade de Geographia de Lisboa no Brazil	"	
Club de Engenharia	"	
Academia Nacional de Ciencias en Córdoba (Republica Argentina.)		—5.

II.—EUROPE.

(1).—GREAT BRITAIN AND IRELAND.

ENGLAND.

Birmingham Natural History and Microscopical Society	Birmingham.
Journal of Microscopy and Natural Science	Bath.
Scientific Enquirer	"
Bristol Naturalists' Society	Bristol.
Cumberland and Westmorland Association for the Advancement of Literature and Science	Carlisle.
Cambridge Philological Society	Cambridge.
Cambridge Philosophical Society	"
Royal Geological Society of Cornwall	Penzance.
Literary and Philosophical Society of Leeds	Leeds.
Literary and Philosophical Society of Liverpool	Liverpool.
Liverpool Astronomical Society	"
Liverpool Polytechnic Society	"

Royal Geographical Society	London.
Royal Astronomical Society	“
Royal Microscopical Society	“
Royal Society	“
Victoria Institute	“
Quekett Microscopical Club	“
Society for Psychical Research	“
Anthropological Institute of Great Britain and Ireland	“
Royal Colonial Institute	“
Linnean Society of London	“
Geological Society of London	“
London Mathematical Society	“
Institution of Civil Engineers	“
Financial Reform Association	“
British Museum	“
British Museum, Natural History Section	“
Palestine Exploration Fund	“
Patent Office	“
Trübner's American, European and Oriental Literary Record.	“
Physical Society of London	“
National Association for the Advancement of Social Science.	“
Sanitary Institute of Great Britain	“
“Chemical News”	“
Imperial Federation League	“
Iron and Steel Institute	“
“Iron”	“
Society of Antiquaries of London	“
Literary and Philosophical Society of Manchester	Manchester.
Manchester Geological Society	“
Manchester Association of Employers, Foremen and Draughtsmen of the Mechanical Trades of Great Britain	“
Manchester Geographical Society	“
Society of Antiquaries of Newcastle-upon-Tyne	Newcastle-upon-Tyne.
North of England Institute of Mining and Mechanical Engineers	“
Midland Institute of Mining, Civil and Mechanical Engineers.	Barnsley.
Somersetshire Archæological and Natural History Society	Taunton. —47.

SCOTLAND.

Royal Society of Edinburgh	Edinburgh.
Royal Society of Antiquaries	“
Royal Scottish Society of Arts	“
Royal Physical Society	“
Edinburgh Botanical Society	“
Edinburgh Geological Society	“
Scottish Geographical Society	“

Royal Philosophical Society	Glasgow.	
Glasgow Geological Society	"	
Natural History Society of Glasgow	"	
Institution of Engineers and Shipbuilders of Scotland.	"	—11.

IRELAND.

Royal Irish Academy	Dublin.	
Royal Dublin Society	"	
Royal Geological Society of Ireland	"	
Institution of Civil Engineers of Ireland	"	
Naturalists' Field Club	Belfast.	
Belfast Natural History and Philosophical Society	"	—6.

(2.)—AUSTRIA-HUNGARY.

Société Hongroise de Géographie	Budapest.	
Siebenbürgischer Verein für Naturwissenschaften	Hermannstadt.	
K. Böhmische Gesellschaft der Wissenschaften	Prag.	
K. K. Universitäts-Sternwarte	"	
Naturhistorischer Verein "Lotos"	"	
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Civico Museo di Storia Naturale di Trieste	Trieste.	
K. K. Akademie der Wissenschaften	Wien.	
K. K. Geologische Reichsanstalt	"	
K. K. Geographische Gesellschaft	"	
K. K. Zoologisch-Botanische Gesellschaft	"	
K. K. Naturhistorisches Hofmuseum	"	
K. K. Central Anstalt für Meteorologie und Erd-Magnetismus.	"	
Anthropologische Gesellschaft in Wien	"	
Wissenschaftlicher Club in Wien	"	
Oesterreichischer Ingenieur-und Architekten Verein	"	
Internationales Permanentes Ornithologisches Comité	"	—17.

(3.)—BELGIUM.

Académie Royale des Sciences, des Lettres et des Beaux Arts de Belgique	Bruxelles.	
Société Royale de Botanique de Belgique	"	
Société Royale Belge de Géographie	"	
Musée Royale d'Histoire Naturelle de Belgique	"	
Société Liégeoise de Littérature Wallonne	Liège.	—5.

(4.)—DENMARK.

Kongelige Bibliotheket	Copenhagen.	
Kongelige Danske Videnskabernes Selskab	"	
Kongelige Nordiske Oldskrift Selskab	"	
Nordisk Tidskrift for Filologi	"	—4.

(5.)—FRANCE.

Académie Nationale des Sciences, Arts et Belles-Lettres	Caen.
Société Nationale des Sciences de Cherbourg	Cherbourg.
Académie des Sciences, Arts et Belles-Lettres de Dijon	Dijon.
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Société Géologique de Normandie	Le Havre.
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Société pour l'Étude des Langues Romanes	Montpellier.
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Annales des Mines	Paris.
Annales des Ponts et Chausées	“
Société des Ingénieurs Civils	“
Société Nationale des Antiquaires de France	“
Société Géologique de France	“
Société Académique Indo-Chinoise de France	“
Société d'Ethnographie	“
Société Américaine de France	“
Société d'Anthropologie de Paris	“
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“Cosmos”	“
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Association Française pour l'Avancement des Sciences	“
Journal des Sociétés Scientifiques	“
Revue Scientifique	“
Revue de Linguistique et de Philologie Comparée	“
Société Zoologique de France	“
Société Mathématique de France	“
Bulletin d'Histoire Ecclésiastique et d'Archéologie Religeuse des Diocèses de Valence, Digne, Gap, Grenoble et Viviers.	Romans. —29.

ALGERIA.

Société de Géographie et d'Archéologie de la Province d'Oran.
Académie d'Hippone.—2.

(6.)—GERMANY.

Naturforschende Gesellschaft zu Freiburg	Baden.
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Verein für Naturkunde	Offenbach-am-Main.
Zeitschrift für Physiologische Chemie	Strassburg.
Nassauischer Verein für Naturkunde	Wiesbaden.—37.

(7.)—ICELAND.

Islenzka Fornleifafélags	Reykjavik.—1.

(8.)—ITALY.

R. Accademia Petrarca di Scienze, Lettere ed Arti	Arezzo.
Ateneo di Brescia	Brescia.
Società Storica per la Provincia e Antica Diocesi di Como	Como.
R. Istituto di Studi Superiori in Firenze	Firenze.
Società Italiana di Antropologia, Etnologia, e Psicologia Comparata	“
Sezione Fiorentina della Società Africana d'Italia	“
Società Entomologica Italiaena	“
Società di Lettura e Convrsazione Scientifiche	Genova.

R. Accademia di Belle Arti	Milano.	
R. Istituto Lombardo di Scienze e Lettere	“	
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R. Comitato Geologico d'Italia	“	
R. Accademia dei Lincei	“	
Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche	“	
“Cosmos” di Guido Cora	Torino.	
Archivio di Letteratura Biblica ed Orientale	“	
Notarisia Commentarium Phycologicum	Venezia.	—24.

(9.)—NETHERLANDS.

Koninklijke Akademie van Wetenschappen	Amsterdam.	
Koninklijke Zoologisch Genootschap “Natura Artis Magistra”	“	
Nederlandsch Aardrijkskundig Genootschap	“	
École Polytechnique de Delft	Delft.	
Société Hollandaise des Sciences à Harlem	Harlem.	
Fondation de P. Teyler van der Hulst	“	
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Nederlandsche Dierkundige Vereeniging	“	
Recueil des Travaux Chimiques des Pays-Bas	“	
Koninklijk Nederlandsch Meteorologisch Instituut	Utrecht.	—10.

(10.)—NORWAY.

Musée de Bergen	Bergen.	
Polytekniske Forening	Kristiania.	
Forening til Norske Fortidsmindesmerkers Bevaring	“	
Videnskabs Selskabet	“	
Kongelige Norske Frederiks Universitetet	“	
Nyt Magazin for Naturvidenskaberne	“	
Norwegische Commission der Europæischen Gradmessung	“	—7.

(11.)—PORTUGAL.

Sociedade de Geographia de Lisboa	Lisboa.	
Académie Royale des Sciences de Lisbonne	“	—2.

(12.)—RUSSIA.

Kharkow Mathematical Society	Kharkow.	
Société des Naturalistes à l'Université Impériale de Kharkow	“	

Société des Naturalistes à l'Université de St. Wladimer	Kiew.
Societas Scientiarum Fennica Helsingfors	Helsingfors.
Tifliser Observatorium	Tiflis.
Société Impériale des Naturalistes de Moscou	Moscow.
Société Physico-Chimique Russe à l'Université de	St. Petersbourg.
Comité Géologique	St. Petersbourg. —8.

(13.)—SPAIN.

"Crónica Cientifica"	Barcelona.
Real Academia de Ciencias Morales y Politicas	Madrid.
Real Academia de la Historia	"
Sociedad Geográfica de Madrid	" —4.

(14.)—SWEDEN.

Kongliga Universitetet	Lund.
Kongliga Fysiografiska Sällskapet	"
Kongliga Svenska Vetenskaps Akademien	Stockholm.
Kongliga Biblioteket	"
Kongliga Universitetet	"
Svenska Sällskapet för Antropologi och Geografi	"
Geologiska Föreningens i Stockholm	"
Acta Mathematica	"
Kongliga Universitetet	Upsala —9.

(15.)—SWITZERLAND.

Geographische Gesellschaft von Bern	Bern.
Naturforschende Gesellschaft in Bern	"
Société de Physique et d'Histoire Naturelle	Genève.
Société de Géographie de Genève	"
Société Neuchateloise de Géographie	Neuchatel.
Naturforschende Gesellschaft in Zurich	Zurich.—6.

(16.)—TURKEY.

Syllogue Littéraire Grec de Constantinople	Constantinople.
Institut Météorologique de Roumanie	Bucarest.—2.

III.—ASIA.

(1.)—INDIA.

Asiatic Society of Bengal	Calcutta.
Geological Survey of India	"
Survey of India Department	"
"Indian Antiquary"	Bombay.
"Orientalist"	Kandy, Ceylon. —5

(2.)—JAPAN.

University of Tokio	Tokio.	
Asiatic Society of Japan	"	
Deutsche Gesellschaft für Natur-und Völkerkunde Ostasiens	"	
Literature College of Imperial University of Japan	"	—4.

(3.)—JAVA.

Bataviaasch Genootschap van Kunsten en Wetenschappen	Batavia	
Nederlandsch-Indische Maatschappij van Nijverheid en Landbouw	"	—2.

(4.)—CHINA.

China Branch of the Royal Asiatic Society	Shanghai.	—1.

IV.—AUSTRALASIA.

(1.)—AUSTRALIA.

Royal Society of New South Wales	Sydney.	
Department of Mines, New South Wales	"	
Linnean Society of New South Wales	"	
Board of Technical Education	"	
Royal Society of Queensland	Brisbane.	
Royal Society of Victoria	Melbourne	
Public Library of Victoria	"	—7.

(2.)—NEW ZEALAND.

New Zealand Institute	Wellington	—1.

(3).—TASMANIA.

Royal Society of Tasmania	Hobarton.	—1.

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Charles Carpmeal, M.A., F.R.S.C.	1887-88

CONTENTS.

PAGE
Officers of the Canadian Institute, 1887-8 iii
Presidents since 1849 iv
List of Members 345
List of Exchanges 350
Proceedings, Session 1887-8 1–61
Sociological Circular 62

PAPERS.

I.—Snake Poisons.
Dr. J. H. Garnier 2

II.—Old Shore Lines in the Ontario Basin.
G. R. Gilbert 2

III.—Experiments in Governing Canada.
D. A. O'Sullivan, D.C.L. 6, 254

IV.—The Eskimo Race and Language.
A. F. Chamberlain, B.A 8, 261

V.—Recent French Investigations in Hypnotism.
Prof. R. Ramsay Wright 10

VI.—Electro-Therapeutic Apparatus.
Dr. A. M. Rosebrugh 14

VII.—Maize and its Derivatives.
C. Gordon Richardson 17

VIII.—Teredo Navalis.
J. F. Garden 17

IX.—The Influence of Tobacco and Alcohol on Vision.
G. S. Ryerson, M.D., L.R.C.S., Edin 18

X.—Recent Advances in Telegraphy and Telephony.
Hugh Neilson 20

XI.—The Mining Industries of Canada.
W. H. Merritt, F.G.S 21

XII.—Individualism from a Social and Historic Point of View
T. B. Browning, M.A 21

XIII.—The Electro-Mercurial Amalgamation of the Precious Metals from Argentiferous and Auriferous Ores.
Charles M. Dobson, M.E 22

XIV.—The Caves and Pot-holes at Rockwood, Ont.
Prof. J. Hoyes Panton 24, 244

PAGE.

XV.—THE OUTBURST OF SUN SPOTS IN 1887.
Andrew Elvins 24

XVI.—THE CATAWBA LANGUAGE.
A. F. Chamberlain, B.A 25

XVII.—THE ESKIMO OF HUDSON'S STRAIT.
F. F. Payne 26, 213

XVIII.—THE WATER TEMPERATURES OF LAKE ONTARIO.
Alan Macdougall, M. Inst., C.E.............. 27

XIX.—THE STUDY OF ECONOMICS.
W. A. Douglass, M.A. 27

XX.—CAPITAL.
Charles Levey 29

XXI.—THE CANADIAN SPECIES OF PICEA OR SPRUCE FIRS.
George Lawson, Ph.D., LL.D............ .31, 169

XXII.—DAVID THOMPSON, THE PIONEER GEOGRAPHER OF THE NORTH-WEST.
J. B. Tyrrell, M.A., F.G.S 31, 135

XXIII.—THE IROQUOIS BEACH.
J. W. Spencer, M.A., Ph.D.................. 31

XXIV.—INDIAN RELICS FROM BALSAM LAKE.
G. E. Laidlaw................ 31

XXV.—CREATION.
J. A. Livingston............................ 32

XXVI.—SCIENTIFIC ASPECT OF THE HENRY GEORGE MOVEMENT.
W. Houston, M.A 33

XXVII.—MIRACLES.
Gerald Fitzgerald 39

XXVIII.—NOTES ON ZOOLOGY.
Harry Piper......... 39

XXIX.—MAMMALIA OF CANADA.
J. B. Tyrrell, B.A., F.G.S..... ....40, 66

XXX.—THE BLACKFOOT SUN DANCE.
Rev. John McLean, M.A..................40, 231

XXXI.—A SCHEME OF POLITICAL ECONOMY.
W. A. Douglass, B.A 40

XXXII.—RELATION BETWEEN POLITICAL SCIENCE AND PRACTICAL POLITICS.
W. Houston, M.A 40

XXXIII.—THE CHAMBERLAIN TREATY—1888.
T. B. Browning, M.A 42

XXXIV.—SHOULD THE PRIVILEGE OF MAKING WILLS BE RESTRICTED?
G. M. Rae 43

XXXV.—DEVELOPMENT OF LANGUAGE.
Horatio Hale.................. ....43, 92

XXXVI.—WHENCE DID THE SCANDINAVIANS OBTAIN THEIR KNOWLEGE OF THE COMPASS?
Capt. Stupart, R.N 44

PAGE.

XXXVII.—PECULIARITIES AND EXTERNAL RELATIONS OF THE GAELIC LANGUAGE.
David Spence 45, 238

XXXVIII.—GEOLOGICAL FORMATION AT PORT COLBORNE.
John C. McRae 46, 338

XXXIX.—THE MISSISSAUGA LANGUAGE.
A. F. Chamberlain, B.A 46

XL.—THIRTY-NINTH ANNUAL REPORT.
Charles Carpmael, M.A 53

XLI.—A CONTRIBUTION TO THE STUDY OF THE FRANCO-CANADIAN DIALECT.
J. Squair, B.A 161

XLII.—ELOCUTIONARY DRILL CHART.
T. B. Browning, M.A 181

ERRATA :

In "The Development of Language."

Page 96, line 18 ; insert " and " before " issuing."

" 113, line 3 from foot ; for " or " read " and."

" 118, line 6 ; for " *witsaia* " read " *witsaiu*."

" 119, line 23, for " word " read " words."

On Page iii. of Vol. V., for 1887-1888, read 1886-1887.

PROCEEDINGS

OF

THE CANADIAN INSTITUTE,

SESSION 1887-88.

FIRST MEETING.

First Meeting, 5th November, 1887, the President in the chair.

Donations since last meeting, 76; Exchanges, 1112; of which 25 were new exchanges.

The following were elected members:—D. W. Clendenan, Canniff Haight, John Charles Dent, Allan McLean Howard.

The following resolution was moved by James H. Pearce, seconded by J. D. Tyrrell, M.D., and carried:

That the Canadian Institute having been formally advised during the vacation of the death of Spencer Fullerton Baird, LL.D., Director of the U. S. National Museum, and Secretary of the Smithsonian Institution, Washington, take the opportunity of the first meeting of the session, to place on record their high appreciation of his executive powers and ability as a naturalist, displayed during a period of so many years when in charge of the most important scientific institutions of the United States, and instruct their Secretary to convey this motion of condolence to the Directors of the Institution over which he so long and ably presided.

Mr. Pearce, on behalf of the Industrial Exhibition Board, presented the gold medal awarded to the Institute for their exhibit of Archaeological Specimens at the Exhibition of 1887.

Mr. Alderman Piper on behalf of Mr. Cordier, presented a piece of the Obelisk, Central Park, New York.

L.Soc.23.70
Gift of The Institute
Rec. 1888-89,

Dr. J. H. Garnier read a paper on Snake Poisons, an abstract of which appears on page 255 of the previous volume.

SECOND MEETING.

Second Meeting, 12th November, 1887, the President in the chair.

Exchanges since last meeting, 27.

A report from the Council was read that they "regret exceedingly that the President, Mr. W. H. VanderSmissen, has found it necessary, in consequence of the increased duties devolving upon him at University College, to withdraw from the office of President. They can only express inadequately in a short notice their appreciation of his services in filling the chair with efficiency and dignity, and more especially in the administrative talent he has displayed in organizing the several sections. In view of the importance of the office, they do not desire to avail themselves of their right to elect a successor, but leave the election to the Institute; at the same time, they recommend the name of Mr. Charles Carpmael."

The report was received and adopted, and on motion by Dr. Ellis, seconded by Mr. Marling, Mr. Carpmael was elected President for the remainder of the term.

The following were elected members :—Capt. Stupart, R.N. John Townsend, Andrew Rutherford, George Macdonald, John I. Davidson, H. R. Fairclough, B.A., W. O'Connor, M.A., George W. R. White.

Mr. Alan Macdougall read a paper by Mr. G. R. Gilbert, of the U. S. Geological Society, on "Old Shore Lines in the Ontario Basin," as follows :

In 1837, a paper on this subject, prepared by Mr. Thomas Roy, of Toronto, a civil engineer, was presented to the Geological Society of London. It described a series of terraces and ridges observed by him between Lake Ontario and Lake Simcoe, and believed to mark old water levels; and it also advanced certain speculations in regard to the extent and history of the water body producing them. The printed minutes of the society are concerned chiefly with his speculations and do not give his particulars of observation; but these have been partially preserved in other ways, although his paper was probably never published in full. Sir Charles Lyell, who visited Toronto in 1842, and went over the ground with Mr. Roy, devoted several pages of his "Travels" to a description of the phenomena. Prof. James Hall published in 1843 a list of eight altitudes of shore lines measured by Roy, and these with five others appear in the report of the Canadian Geological Survey for 1863. The thirteen altitudes are as follows, all being referred to the water surface of Lake Ontario:—762, 732, 680, 624, 556, 500, 420, 400, 344, 308, 280, 208, and 108 feet. In 1861 Mr. Sandford Fleming described in the pages of the *Canadian Journal* an ancient shore line passing north of Toronto and having an altitude above Lake Ontario of about 170 feet. A comparison of his text, which is full and eminently satisfactory, with that of Lyell leads to the belief that the shore line he describes is identical with the second of Roy's series, although the recorded measurements, 170 feet and 208 feet, do not closely correspond. Roy's determinations have been cited by nearly all writers who have discussed the ancient hydrography of the Laurentian basin, but I am not aware that anyone since Lyell has verified his observations. Mr. G. J. Hinde speaks in one place of "the well-defined terraces between Toronto and Lake Simcoe," and says in another, "From an imperfect examination, however, it appears to me doubtful if the higher terraces (of Roy) furnish unequivocal evidence of having been formed by the working back of the lake." Professor J. W. Spencer perhaps implies acquaintance with the ground, for, after quoting Roy's measurements, he says:—"Additional gravel beaches occur along the Northern railway at 600 feet, and on descending towards Georgian Bay, at 520, 388, 354 feet above lake Ontario. A still finer series of beaches may be seen from Toronto westward along the Toronto, Grey and Bruce railway." Being called by other errands to the city of Toronto, I undertook last September to verify the observations of Roy and Lyell, and especially to repeat Roy's measurements, whose accuracy appeared to be impeached by Fleming's observation. With this intent I traversed the slope from Aurora to Toronto, following Yonge street in the main, but diverging where that line seemed ill-suited for the preservation and exhibition of old shore lines. To my surprise my observation was almost entirely negative, the only shore line recognized being the one described by Fleming. Below that level I cannot say that I saw the slope at a point favorable for such observation, but above 170 feet, and thence to the height of land between Lakes Ontario and Simcoe, the facilities for observation were exceptionally good. The ground traversed is cleared of forest, and I saw it after the crops had been harvested. The superficial formation is drift, which has an undulating topography, graduating near the height of land into the hummock-and-kettle type. It is eminently fitted to receive and preserve a record of wave action, and the facilities for observation were exceptionally good, certainly far better than when Roy and Lyell made their excursions through the forest. In a court of law the evidence of several witnesses who saw an occurrence far outweighs that of a single witness who did not see it, and I therefore do not dispute the classic observations of Roy and Lyell. But I publish my unsuccessful attempt in the hope that others may repeat it, or else may find the phenomena I failed to discover, and give me references to the precise localities.

Mr. Ives stated that his attention having been drawn to the curious conflict of testimony on the subject, he had referred to the brief notice of Mr. Roy's communication to the Geological Society, which occupied only one page of its proceedings. He drew attention to the fact that Lyell in his Travels in North America speaks of Mr. Roy's "endeavor to explain the phenomena by supposing the existence of a vast inland sea," and seems to imply that his communication had not carried conviction. Mr. Ives also pointed out that when Lyell accompanied Roy on horseback, several hours' ride through almost impenetrable bush, he had no opportunity of verifying the measurements of the latter. He states that he took Mr. Roy's work to be reliable, but differed from him as to the mode in which the lodges were formed, attributing to them a marine origin as opposed to Roy's theory of a vast lake.

In connection with the reference to the paper of Mr. Sandford Fleming, read before the Canadian Institute March 2nd, 1861, it was remarked that Mr. Gilbert appeared to have overlooked a communication made to the Institute two weeks later by Professor Chapman on "The Ancient Extension of the Lake Area of Western Canada."

Referring to the allusion to Mr. G. J. Hinde's paper, in which he speaks of "well-defined terraces between Toronto and Lake Simcoe," Mr. Ives wished to point out that that author only intended to state what Lyell was "attracted to Toronto to examine," whilst later on he says: "these terraces are *said* to exist," etc., and in the same paragraph, "from an imperfect examination, however, it appears to me," etc.

Mr. Ives stated that he had gone over the ground as far as Lansing without being able to recognize any other beach than that recognized by the author, and by Mr. Sandford Fleming, with the exception of a slight rise following roughly the line of College and Carlton streets, corresponding to the first terrace of Sir Charles Lyell, "situate one mile north of the lake shore," which, however, he thought hardly entitled to be called a terrace.

Mr. Boyle thought that Mr. Ives was mistaken in supposing that Mr. Hinde had not gone over the ground himself. He believed that Professor Chapman's explanations had been made not so much with the view of exploring the terraces as of ascertaining the marine mollusca.

NOTE.—Subsequently to the reading of the paper, through the kindness of Mr. Alan Macdougall, Mr. Ives was permitted to inspect in the office of the City Engineer, certain plans and sections recently compiled with reference to the water supply for Toronto, and he wishes to state that he regards those sections as strongly confirmatory of the conclusions of Roy, based probably upon a similar series of measurements, as Lyell states that the levels had been "accurately ascertained by Mr. Roy when employed professionally in making measurements for several projected canals and railroads."

THIRD MEETING.

Third Meeting, 19th November, 1887, the President in the chair.

Donations and exchanges since last meeting, 73.

D. A. O'Sullivan, D.C.L., read a paper on "Experiments in Governing Canada."

He would refer to changes in the mode of governing Canada since the fall of Quebec until 1867 with some references to proposed amendments in the Act of Union of that year. The period prior to the cession and after the capitulations of the two cities was a period of military occupation in which the country was in an unsettled state without its future destiny being quite apparent. It was the government of the drum-head, unsatisfactory to all parties. Government under the Treaty of 1763, is, of course, to be imputed to the British authorities, who were then under no manner of doubt as to the ownership of the country. It lasted for eleven years with a very well founded complaint on the part of the people that by the Proclamation of the Act of 1763 no share in the government was accorded to them. The Quebec Act of 1774 was the first attempt in that direction, and failing to introduce or continue the laws of England in civil matters it was highly objectionable to the English settlers. A sketch of the extended Province of old Quebec was given, showing the boundaries reaching on the south and west to the Ohio and Mississippi rivers. The Constitutional Act of 1791 was the next change brought about by the increase of the English-speaking settlers in the western part of Quebec, now Ontario. This lasted for fifty years, and if any sufficient measure of self government was embodied in it, it would doubtless have survived until a more general union was possible than that foreshadowed by Lord Durham. The Union of 1841 was the last one until the present union. The provinces had then become about equal in point of race and religion, and the Act recognized the two sections of the country. In all these changes the British Ministry had an eye to relative numbers of race and religion. The charter of 1867, the latest of these experiments, is a new departure of Colonial government. It is a system of divided powers—one set for provincial matters and one general government for matters pertaining to all parts of the Dominion. The power of disallowance was the only great inroad on former methods, but the legislation and its prohibition were all in the hands of the one people. The veto power looks offensive, but it has not worked much more injustice than any other means of disallowance might give rise to. It is unpleasant to have matured statutes disallowed, but the Canadian people might find it more objectionable if the disallowance came from a quarter beyond the reach of their votes. If lodged in the Supreme Court or the Judicial Committee of the Privy Council in England it would be as objectionable to those against whom it might be used as it is now, and it would be absolutely beyond correction.

Mr. Marling thought that the whole question of the constitution of the country did not receive that attention it ought in the instruction of the young. He referred to the example of the United States, where the youth were well instructed in the nature of their constitution and government.

Mr. G. M. Rae agreed with Mr. Marling as to the importance of our young people being well informed in regard to the nature of the government under which they live, and in the principles of political science. There would be a difficulty, however, in accomplishing this, arising from the differences between the two great political parties.

Mr. W. Dale was of opinion that the youth should be taught the history of their country without any reference to party questions. He knew from his own experience that the amount of ignorance in the matter was very great. He thought that the instruction required could be imparted without touching party politics. He inquired whether the relationship to the Crown in regard to the ownership of land in Canada was the same as under the French monarchs.

Dr. O'Sullivan said it was a difficult question. In England the tenure of land was a system of tenancy, not allodial. The English monarch succeeded to the rights of the French monarch. He did not think that any allodial rights extended back to 1763.

Mr. T. B. Browning said that prior to 1790 the old regulations of France were in force, since that time the land was held in free and common soccage.

FOURTH MEETING.

Fourth Meeting, 26th November, 1887, W. H. Ellis, M.A., M.B., in the chair.

Donations and exchanges since last meeting, 40.

On a communication from the Biological Section in reference to the appointment of an Ornithologist on the Geological and Natural History Survey of Canada, it was moved by Mr. J. B. Williams, seconded by Mr. G. G. Pursey, and carried, That the matter of petitioning Government as to the appointment of an Ornithologist be referred to the Council.

A. B. Macallum, M. A., and John Linden, were elected members.

Mr. A. F. Chamberlain read a paper on "The Eskimo Race and Language."

After describing the habitat of the Eskimo, a territory which, although seldom exceeding 150 miles in width, extends from north-west to south-east, about 3,000 miles, or along the coast (by which road the Eskimo, who are essentially a littoral people, migrate) a distance of fully 5,000 miles, he said the Eskimo is the only aboriginal race which inhabits both the Old and the New Worlds, branches of this stock being found in North-east Siberia as well as throughout Arctic America. He discussed the various theories with regard to the origin of the Eskimo and their migrations in the prehistoric past. The generally accepted view up to within a few years since was that the Eskimo were a comparatively recent modification or offshoot of the Mongol tribes of North-east Asia. This was the opinion of Cranz, the historian of Greenland, and at the present day is advocated by Rae, Peschel, Flower, and many others. Dr. Rink and Dr. Robert Brown, however, some years ago set forth the theory that the Eskimo are the remnants of an original race, forced by stress of circumstances and the pressure of more powerful enemies into the position they now occupy. This view is shared by W. H. Dall, Dr. C. C. Abbott, Dr. Aurel Krause, Dr. F. Boas and others. Dr. Rink thinks that the home of the primitive Eskimo was in Alaska; Dr. Boas would place it in the "west of the Hudson's Bay region." The author inclined to favor a modification of Dr. Boas' theory, which would bring the Eskimo into close relationship with the great Huron-Cherokee family, whose primitive seat is placed by Horatio Hale " in Eastern Canada on the banks of the St. Lawrence," and with the mound-builders of the Ohio Valley, whilst behind the latter would be primitive Aztecs, of the Colorado-California region. He pointed out that the root of the word for copper is the same in Eskimo (*kannu-yak*), Iroquois (*kana-dzia*), Mohawk (*quenn-ies*) and Japanese (*kae-e*), and suggested that the Japanese, who are but comparatively late intruders into Niphon, may have been an offshoot of and the present representatives of the mysterious mound builders. He referred to the question of the former southward extension of the Eskimo, thinking that there was much to favor the theory of Dr. C. C. Abbott, Prof. E. W. Claypole, etc., that the palæolithic man of the river-drift of New Jersey, is now represented by the Eskimo. He also discussed the important theory first advanced by Professor Boyd Dawkins in 1866, and since advocated by Mortillet, the distinguished French anthropologist, that the Eskimo is the modern representative of the man of the palæolithic river-drift of France, and thought that the Eskimo probably came from Europe, although much might be said in favor of deriving palæolithic man from America. Indeed, Baron Nordenskjold has advanced the view that the Eskimo are the remnants of an ancient Polar or Hyperborean race, once much more extensive and important. The author stated his reasons for believing that relatives of the Eskimo are to be found in the fossil men of Brazil, as well as among the Botocudos, Fuegians, and other South American tribes. He thought there was a sub-stratum of dolichocephalic Eskimo-like races, followed by immigrants from Europe or North Africa, of Basque or Iberian ancestry. He gave comparative vocabularies to illustrate the connection between the Eskimo dialects and the languages of British Columbia; those of the Huron-Algonkin, Cherokee-Choctaw, and other Indian stocks. He pointed out, however, that while the American Indian languages are strongly agglutinative and incorporating, the Eskimo language is agglutinating only. In illustration of the language he presented vocabularies, drawn from various sources, of some twenty five Eskimo dialects, including those of Davis and Frobisher, which seem to have been overlooked by Mr. Pilling in his recently-published biography of the Eskimo language. A most important part of the paper was the comparative Eskimo-Turanian vocabulary of over 250 words, showing the relation between the Turanian languages of N.E. Asia and the Eskimo, in support of his view that these languages have had a common origin, and that the Eskimo is the representative of the parent stock. The author also produced archæological, craniological, historical and topographical arguments in favor of this theory. In the comparative vocabulary there are given 100 Japanese words alone whose representatives are found in the Eskimo dialects, thus confirming by linguistic evidence the close relation of the Eskimo and Japanese advocated by Professor Flower, on physical and anatomical grounds.

Mr. F. F. Payne described some of the customs and habits of the Eskimo that he had observed when at Stupart Bay. His experience had been confined to that particular locality. He had been more interested in the natural history of the country, though he had watched their habits a good deal. They were very much scattered, and shifted about according to their need of food. Their villages were small, not containing over a dozen huts. They made offering to their dead. He had found two old guns and a quantity of bullets and shot which had been offered to the sun. He had put up a beacon and they made offerings to that. If they kill a seal or a walrus they will not go out for three days. They never seemed to have any meetings. They believed in a great spirit, and in a future state. They believed that it was in the south, where they would have plenty to eat and have nothing to do.

FIFTH MEETING.

Fifth Meeting, 3rd December, 1887, W. Brodie, Esq., in the chair.

Exchanges since last meeting, 22.

Rev. D. W. Watson, D.D., was elected a member.

Prof. R. Ramsay Wright read a paper on Recent French Investigations on Hypnotism.

He remarked that the attention of European scientific men had been within the last ten years attracted to the phenomena of hypnotism by the remarkable results obtained by two professional exhibitors, Hansen, a Dane, and Donato, a Belgian. Physiologists, psychologists and physicians have been engaged in investigating these phenomena from their respective standpoints with the result that many facts had been established which a few years ago would have elicited a smile of incredulity. French neurologists have especially made progress in the study, because hysteria, and hystero-epilepsy (which render subjects very susceptible to hypnotic influences) are extremely common in France. Hypnotism has been found of great service in the treatment of these diseases, and in the hands of men like Charcot escapes the stigma of being "unprofessional," which arrested the first serious English investigations some 40 years ago. The phenomena of hypnotism or somnambulism may either occur without any obvious inducing cause (auto-somnambulists who fall at once into the sleep-walking or sleep-waking condition without passing through the ordinary initial lower phases), or they may be induced by the subject (as in the case of the Indian fakirs, who can render themselves insensitive to pain), or finally they require to be elicited by an operator who uses physical means such as "passes," or the fixation of the eyes on a bright spot, or else physical means such as the imperative "suggestion" to sleep. Such cases of induced hypnotism may, if they have been frequently hypnotised, fall like the somnambulists at once into the higher sleep-waking phases, but most subjects exhibit initial phases of somnolence with succeeding deeper sleep in which either catalepsy with plasticity of the muscles (retaining any position in which they are placed), or lethargy in which the muscles are easily excited to contraction, are prominent symptoms. The use of a series of magnets so arranged as to slip over the finger has been recommended to detect susceptibility to hypnotism, but Professor Delbœuf believes that these "hypnoscopes" are only useful as such because they disclose a lively power of imagination in suitable subjects. Various cases were cited, however, to show that the magnet appears to produce remarkable results on subjects already hypnotized, causing transfer of anæsthesia, *e. g.* from one side of the body to the other, and reversing suggested ideas or sensations by calling into prominence their correlative opposites. Prof. Wright called the attention of the philological section of the institute to the works of Dr. Abel, of Berlin, which show how the relativity of consciousness has expressed itself in the roots of primitive languages such as the Egyptian, where the same root may involve diametrically opposite meanings. The well-known phenomena of the hyperæsthesia, both of smell and sight, in certain hypnotic stages were next referred to. The suggestion, *e. g.*, is made to a subject that one out of numerous blank cards bears a photograph, and although the cards are shuffled the particular one can always be picked out owing to some insignificant mark or irregularity of surface which ordinarily would not attract attention, and which the subject does not appear to be conscious of. An excellent illustration of this was cited in a case described by Dr. Janet, where there was double consciousness and double personality. The subject when hypnotized was in virtue of her double personality able to converse with those present about the suggested photograph, while simultaneously in response to a suggestion in a different tone by the operator she could explain by automatic writing (entirely unconscious as far as the other half of her personality was concerned) the real peculiarity by which the card was recognized. The kind of hyperæsthesia in virtue of which subjects have been said to be able on suggestion to experience the effects of drugs in closed bottles (the subject being ignorant of the nature of the drug and its physiological effects) was discredited, and the phenomena attributed to unconscious suggestion of the proper effects by the operator or his assistants. On the other hand, instances of blisters having been excited by suggestion were alluded to, as well as the possible explanation thus afforded for cases of stigmata such as those of Louise Lateau. The carrying out of suggestions at a set time after waking was shown by Delbœuf's experiments to be accompanied by an unconscious waiting for the hour or day in question, and by a feeling of awaking after performing the act, which shows that the arrival of the hour acts as a suggestion to fall into the hypnotic state. After some references to the difficulties afforded by apparently well-established instances of suggestion at a distance, and to the recent collapse of some of the evidence for thought-transference relied on by the English Society for Psychical Research, Professor Wright concluded by stating that his address was to be regarded as a review of articles contributed by various scientists to the *Revue Philosophique* during the last year, and that he himself had had no opportunity of investigating the phenomena personally.

Dr. Workman in connection with the paper, called attention to the kindred subjects of dual personality, catalepsy, and the influence of the imagination in creating visions and apparitions. Those alternative states of consciousness, in which the person seemed to pass through two different modes of existence, were too well confirmed by numerous well attested cases to admit of doubt.

In catalepsy there seemed to be no intervening state of consciousness during the attack. The person, after the fit, took up, as it were, the thread of existence where it had suddenly stopped, as in the case of a lady who when playing upon the piano, was seized by catalepsy, and when she recovered, continued at the same note where she had left off. The powerful influence of the imagination was well known. He referred to a recent instance in the case of a girl about 13 years who when taking care of sheep saw the Madonna and child. Her experience was confirmed by all the people of the district, who also saw the Madonna and Bambino. This could be accounted for by the state of expectancy influenced by a strong effort of the imagination.

Dr. Canniff said it was a question whether hypnotism should be considered a science. Every science had a counterfeit : was not this a counterfeit science ? He had yet to learn whether hypnotism had been of any benefit to mankind. As to the alleged cases of cure, he thought that they could be referred to the influence of the imagination.

Mr. Brodie thought that no one could be brought under the influence of hypnotism unless he was in a diseased state.

Prof. Wright considered that the claims of hypnotism to the rank of a science were now well established. They were recognized by some of the most eminent men of the day. Many important cures had been undoubtedly effected by it. It was constantly used by celebrated French physicians. One had stated that in 744 cases in which he had employed it, he had been unsuccessful in only 72 instances. These could not be referred to the influence of the imagination.

Dr. Workman thought that Hypnotism had a very bad effect on the nervous system.

SIXTH MEETING.

Sixth Meeting, 10th December, 1887, the President in the chair.

Donations and exchanges since last meeting, 40.

J. J. MacKenzie, B.A., was elected a member.

Dr. A. M. Rosebrugh read a paper on "Electro-Therapeutic Apparatus," and some new instruments were exhibited and described. The paper was introduced by a brief sketch of the history of medical electricity, showing that electro-therapeutics has been very much retarded in its development by the slow progress of electro-physics. One of the earliest treatises on this subject was written about the middle of the last century, and strangely enough by a clergyman, namely, the Rev. John Wesley. In this treatise Wesley anticipates much that has since been accomplished. He also suggests the probable electrical origin of the "northern lights," and, independently of Franklin, recommends the use of lightning rods. This was forty years before the discovery of galvanism, and seventy years before the discovery of the faradic or induced current. Static electricity from frictional machines was the only form of electricity then known. Galvanism was discovered in 1786 and the voltaic pile in 1800; but very little progress was made in the use of the galvanic current until after the discovery of the faradic current and not until after the discovery of better battery cells by Daniel, Grove and Bunsen, about 30 years ago. Electro-therapeutics has made great progress during the last 10 or 15 years, and this is largely due to greatly improved apparatus. As important improvements have been made quite lately in this direction, still greater progress in medical electricity may be expected in the near future.

Modern electro-therapeutic apparatus may be described as follows: —1. A faradic battery. 2. A galvanic battery, with not less than 30 cells. 3. A good galvanometer. 4. A rheostat. 5. A commutator or its equivalent. 6. Rheophores or insulated wires for conveying the current, and 7, a complete set of electrodes. As a complete set of apparatus is present for inspection a detailed description is unnecessary.

In the matter of galvanic batteries the portable form is the most convenient for general practice, while large cells in a stationary form are used in hospitals and also by specialists in office practice. Portable batteries have been greatly improved of late and seem to leave very little to be desired. For general purposes the portable chloride of silver battery is the most convenient, while for electrolysis and especially for operations in gynæcology a modification of the McIntosh zinc-carbon or chromic acid battery is to be preferred. He wished, however, more particularly to call attention to some new apparatus quite recently devised for regulating, controlling and registering the galvanic current when used in medicine or surgery. These are, first, a new form of galvanometer, called a milliampère meter; second, a new form of rheostat.

The milliampère meter is a modification of the galvanometer, and indicates, firstly, the presence of the galvanic current; secondly, its direction; and thirdly, the strength of said current in milliampères. By the use of this instrument the dose of electricity may now be both prescribed and administered as definitely as a dose of medicine can be weighed or measured. The new rheostat, known as the Bailey rheostat, is an apparatus for interposing a column of water into the galvanic circuit so as to break the force of said current before it is allowed to pass through vital parts of the body.

It prevents any shock to the nervous system, and furthermore, when combined with the use of the milliampère meter, the strength of the current can be very accurately gauged by increasing or diminishing the quantity of water interposed in the circuit. The maximum number of cells are placed in direct circuit, and no commutator for increasing or diminishing the number of said cells is required, the strength of the current being regulated wholly by the rheostat. This is much safer, more economical and more convenient than the old method, and these two additions to electro-therapeutic apparatus mark a new departure —a new era, in fact—in electro-therapy.

The vagueness of empiricism gives place to mathematical precision, and this branch of medical science is at once lifted to a higher plane of dignity and importance.

In answer to a question by the President as to what proportion of the current of electricity passed through the train, Dr. Rosebrugh said that the current recorded itself. By placing needles in the brain of a cadaver the galvanometer showed the amount of the current that had passed through the brain.

Prof. Wright said that it was a matter of congratulation that electro-therapeutics had passed out of the hands of charlatans and had become a part of the regular practice.

SEVENTH MEETING.

Seventh Meeting, 17th December, 1887, the President in the chair.

Donations and exchanges since last meeting, 46.

The Institute having been notified of the election of Professor Samuel Pierpont Langley, LL.D., as Secretary of the Smithsonian Institution, to succeed the late Professor Spencer F. Baird, it was resolved on motion of James Bain, Jr., Esq., seconded by Alexander Marling, LL.B., "That the Secretary be instructed to convey to the Board of Regents of the Smithsonian Institution their congratulations on having secured the services of Professor Samuel Pierpont Langley, LL.D., in the office of Secretary, he being so well qualified to fill the position by his attainments in mathematics and his eminence in physical research."

Alexander Black and John Bertram were elected members.

C. Gordon Richardson, Esq., read a paper on "Maize and its derivatives."

EIGHTH MEETING.

Eighth Meeting, 7th January, 1888, the President in the chair.

Donations and exchanges since last meeting, 133.

The Council reported the election of Mr. P. Neilson Carmichael, as an associate.

A communication from the Audubon Monument Committee of the New York Academy of Sciences, requesting the co-operation of the Institute in the erection of a monument over the grave of Audubon in Trinity Church Cemetery, New York, was on motion of Mr. Browning, seconded by Dr. Ryerson, referred to the Biological section, recommending the appointment of a committee to take up subscriptions.

The President, Secretary, Curator, and the Chairmen and Secretaries of Sections were named a committee to make arrangements for the annual conversazione.

Mr. Macdougall exhibited a section sawn from a fender pile that was recently broken off from the Canadian Pacific railway dock at Vancouver, B.C., by a slight strain from a hawser, it having been weakened and rendered useless by the ravages of that destructive mollusk the *Teredo Navalis.* He also exhibited specimens of the *Teredo* preserved in alcohol; one whole one with the exception of the tail, which had become detached, and the head and tail of another one. The former was about nine inches long. They were sent by Mr. J. F. Garden, late of Toronto, now of Vancouver, B.C., of the firm of Garden & Herman, Civil Engineers. Accompanying the specimens were some remarks on the *Teredo,* by Mr. Garden. He says:—This sea worm is certainly of great interest to Engineers on this coast, as their power of boring into and destroying wooden structures submerged in sea water renders it a difficult problem how to construct wharves and docks, even of a temporary character, that will resist their attacks. The pile from which the section exhibited was cut was driven about fourteen months ago. Externally at first glance the stick seemed to be as sound as when first put in place, but on close examination minute pin holes were seen. Within a thin outer shell the wood is honeycombed in all directions with holes up to half an inch in diameter. Near the outer shell the holes are smaller than towards the center; all of which seems to indicate that the embryo is deposited on the outside and develops in size and rapacity as it works its way inward. The head is covered with a shell open in front with cutting edges like a ship's auger; but instead of the cut wood being outside as with that implement, the particles are drawn into the animal's mouth as it works its way onward, and nearly all of it is assimilated, as but very little dust is found in the passages in the stick. It secretes a thin layer of calcareous matter with which it lines the chambers it eats out. The tail is a most peculiar part of its structure, appearing like the vertebræ of small fishes or two small feathers attached to either side of the extremity, and which is probably used to propel the *Teredo* forward. The rest of the body is a soft white mass. It is said to confine its attacks to wood between high and low water marks, or a distance of about 12 feet in Burrard Inlet. Creosoting has been tried as a preventive, but in many instances with but indifferent success. A stick of "gumwood" brought from Australia was driven some time ago, as it is said to be impervious to them, but I have not learned that it has been examined since. Copper sheathing has been adopted on the piles of a small wharf which has stood for some years here. This is, I believe, about the only complete way of excluding them. Iron piles are largely used in the construction of the C.P.R. wharves.

G. S. Ryerson, M.D., L.R.C.S., Edin., then read a paper on "The Influence of Tobacco and Alcohol on Vision."

He stated that Mr. Jonathan Hutchinson was the first to describe a palsy of the optic nerve with certain general symptoms due to the poisonous influence of tobacco and alcohol. He quoted a number of medical authorities in support of his contention. The conditions which render persons particularly subject to poisonous effect of tobacco are a sedentary occupation, middle life, prolonged use of and rapid consumption of Tobacco. The quantity necessary to produce ill effects was on an average half an ounce daily. He related a case of a man who smoked all day and when awake at night, and another of a cigarmaker who smoked 40 cigars daily. Some persons were much more affected by a small quantity of the "weed" than others; some consume large quantities with apparent impunity. The local symptoms of tobacco and alcohol poisoning are gradually increasing dimness of sight affecting both eyes alike; blindness for the lighter shades of red and green; the sight is better in the twilight; nervousness; sleeplessness; irregular appetite; palpitation and pain over the heart and loss of memory are the general symptoms. Most smokers are alcohol users—but Dr. Ryerson related cases of total abstainers who suffered from this malady, tobacco blindness. A majority of cases are curable, but a certain proportion remain permanently blind.

Mr. Macdougall asked whether Dr. Ryerson's statements referred altogether to persons leading a sedentary life, or to all classes.

Dr. Ryerson. They referred to all classes.

Mr. Macdougall said that he could smoke more when engaged in active work.

Mr. Elvins. Would alcohol alone produce those effects on the vision?

Dr. Ryerson. It would not.

Mr. Livingston. Would chewing alone produce them?

Dr. Ryerson. No.

Mr. Williams called attention to the many cases of colour blindness among railroad men arising from the use of tobacco, so that a law had to be passed against it.

The President thought that a great deal of colour blindness was not caused by the use of tobacco. More attention had been recently paid to the subject, so that the cases were more noticed. This accounted for the increase in the number of cases.

NINTH MEETING.

Ninth Meeting, 14th January, 1888, the President in the chair.

The meeting took the form of a conversazione, the whole building being thrown open to visitors, and an exhibition of views being given by the Photographic Section. During the evening an exhibition of lantern slides by the oxy-hydrogen light was given, the views shown being principally from Switzerland.

Mr. Hugh Neilson, Manager of the Bell Telephone Company, read a paper on "Recent Advances in Telegraphy and Telephony."

In telegraphing by the single wire system, he stated, not much change had been made, except in the substitution of sound instruments for the old paper register. Between large cities the duplex and quadruplex extension system had been introduced, by means of which two and four messages could be transmitted simultaneously through a single wire. The cables were now all made duplex. Another advance yet to be made was the application of the Morse system to cable telegraphy. An important innovation alluded to was train telegraphy, a system by means of which messages could be sent and received on board trains going at the rate of forty to fifty miles an hour. This system was now in operation on the Lehigh Valley railway. The lecturer concluded by a reference to the wonderful development of the telephone system, and said that Ontario, so far as its towns and villages were concerned, had the best telephone service in the world.

TENTH MEETING.

Tenth Meeting, 21st January, 1888, the President in the chair.

Donations and exchanges since last meeting, 82.

The President announced the recent death of an honorary member of the Institute, Professor Balfour Stewart, of Owen's College, Manchester. In giving a brief sketch of his scientific labours, Mr. Carpmael mentioned that in his early electrical and meteorological investigations, he had taken the observations of the Toronto Observatory as a basis.

Professor Chapman, of University College, was elected an honorary member of the Institute.

J. Lester Nichols, was elected an ordinary member.

A communication was read from the trustees of the Elizabeth Thompson science fund, offering aid for the prosecution of scientific research, and stating the grants which had already been made.

A report of the Geological and Mining section on "The Mining Industries of Canada" was referred to the Council with a view to its being printed.

Mr. T B. Browning read a paper on "Individualism, from a social and historic point of view."

Of the Aryan race, the Anglo-Saxon has the most developed form of individualism ; and of the Anglo-Saxon that portion of it which inhabits the northern portion of this continent. The form of society which prevails most widely is a more or less complete communism. The question : what is an individual? is not capable of any but a relative answer. The question is, what is the unit of a society? which varies from age to age. Human beings may be in one respect individuals, while they are not so considered in others, *e.g.*, under criminal and not under civil law, as infants, etc. The lecturer reviewed the evolution of the individual to his present status, in a legal, religious and economic point of view. Individualism has manifested itself in two forms—

negatively, in times of revolution; and positively, in periods of construction and reconstruction. In the latter form he brought forth the influence and benefit of trade unions and friendly societies, such as Oddfellows, Knights of Pythias, Labour, etc., which was said by the lecturer to consist mainly in this—a provision against the precarious condition of industry as it affects the artisan, combined with the desire of association. The living industries of to-day are no longer in the isolated or individualistic conditions contemplated by economists of the last century, but are on both sides combinations. George's theories of taxation and landholding were passed under review, but in the opinion of the lecturer the trend of civilization was in an opposite direction; to make land personalty, to abolish the doctrines of realty, and enlarge rather than diminish the extent of property which may be held in it. The tendency is toward a wider individualism of the constructive or positive form, to which legislation has lent much assistance in regard of social interests of an economic character in late years.

ELEVENTH MEETING.

Eleventh Meeting, 28th January, 1888, James Bain, Jr., Esq., in the chair.

Donations and exchanges since last meeting, 36.

The following were elected members: A. C McKay, B.A., Lieut. Col. George A. Shaw, Alexander Rankin, Alex. Nairn.

Mr. Charles M. Dobson, M.E., read a paper on "The Electro-Mercurial Amalgamation of the Precious Metals from Argentiferous and Auriferous Ores."

He commenced by explaining that miners always experienced considerable difficulty in securing the float and flour gold with present amalgam methods. The present method was to crush the ore, and when reduced to a fine pulp or sand, to allow it to trickle over large copper tables that have been treated to a coating of mercury. The gold sticks to the mercury, and after a quantity has adhered the tables present the appearance of frozen snow. The amalgam is removed with India rubber " squegees " every five hours, and when a quantity is obtained it is squeezed through chamois leather, leaving a heavy hard ball. This ball is placed in a retort, which is heated and the mercury expelled, leaving a sponge-like mass of pure gold, when the crushed ore contains titanic iron sand which adheres to the tables and allows the gold to pass over. From a slight knowledge of electricity possessed by Mr. Dobson, he discovered that a current of electricity would heighten the activity of the mercury and keep the titanic sand in agitation and from adhering. Mr. Dobson explained the working of his machine, and said that with its aid he had extracted ¼ dwt. of gold from 250 lbs of black sand taken from the St. Lawrence region.

Mr. Arthur Harvey believed that the next generation would see Canada one of the most important mining countries in the world. That the Dominion would develop into a great gold producing country, he had no doubt whatever. There was a great gold belt running from Nova Scotia to New Brunswick, through Quebec, going across the St. Lawrence, the Ottawa River, and thence by the north shores of Lake Huron and Lake Superior to Rat Portage and the surrounding district. This gold belt is of almost unparalleled richness. Sir William Logan had said that some day or other Canada would be one of the greatest gold producing countries in the world. Mr. Harvey then gave an account of his personal explorations in the Marmora district. The Moira river came down between the Silurian on one side and the Laurentian on the other. The Richardson mine was just on the edge where the Silurian joined the Laurentian formation. Between these formations one of these gold-producing belts happened to run. He said that it was perfectly certain that on the fourteen miles of that belt there was $500,000,000 worth of gold waiting for exploration. Mr. Squier told him that he had seen $500,000 worth of gold in one pocket. At the same time that the Richardson mine was taken up by people from Chicago, Mr. Gatshall took up a location seven miles from Madoc, which had also been successful. He had himself washed gold there found on the surface, and he never saw any place so rich in auriferous ore as that region. He estimated its produce at $100 a ton, whilst Prof. Chapman had estimated it at $50 or $60 a ton from his own examination. By the present system 90 per cent of the gold was lost, every little particle of gold being covered with a film of arsenic so that the quicksilver would not touch it. If Mr. Dobson's invention succeeds in cleansing the particles of gold from the arsenic, it would be worth millions of dollars to the country. He was glad that there were several barrels of ore in Toronto ready to be tested by this machine. He next referred to the great extent of the gold sands of Canada, and the wealth of the deposits south of Quebec. There was no river which came down from the Laurentian formation that did not carry gold. Referring to his own experience, he had washed gold in the Parry Sound district, at Port Arthur, Pearl River, and other places. He had seen millions of tons of the black sand that produced gold back in Haliburton. Canada has riches beyond belief, and the country was anxiously looking for some scientific process by which this immense wealth would be made available.

TWELFTH MEETING.

Twelfth Meeting, 4th February, 1888, the President in the chair.

Donations and exchanges since last meeting, 44.

Arthur Harvey and John Lamb were elected members.

Prof. J. Hoyes Panton, read a paper on "The Caves and Pot-holes at Rockwood, Ont."

Mr. Andrew Elvins read a paper on "The Outburst of Sun Spots in 1887."

He quoted from T.R.A.S., in "Knowledge," and stated that his own observations were in accord with the statements of that writer. Mr. Elvins also stated by the method adopted by him in papers published in 1871 and 1872, a maximum should have occurred in 1887, but he also stated that he was not quite satisfied that the true period had yet been determined. The fact remained, however, that a maximum was predicted for 1887, and an outburst had occurred during the past year.

The President said that the subject had exercised a great many scientific men for a long time: there were many difficulties attending the investigation of it. In the case of the distance of one maximum to another, when it has risen rapidly from a minimum to a maximum or to maxima on different sides of the equator, it would require a long series of observations to come to a satisfactory conclusion, so that at present we would not be justified in predictions for any one year. Although the fact was indisputable, Mr. Elvins' explanation could hardly be accepted in our present knowledge of the subject. We must wait till we have ascertained the physical cause. Prof. Balfour Stewart had made observations connecting meteorological phenomena with shorter periods as one of 27 days. He found a connection between magnetic disturbances and the appearance of sun spots in short periods from observations made at Toronto, Kew and Prague.

THIRTEENTH MEETING.

Thirteenth Meeting, 11th February, 1888, T. B. Browning, M.A., in the chair.

Donations and exchanges since last meeting, 40.

Mr. Sandford Fleming, C.M.G., F.G.S., was elected an honorary member.

Mr. A. F. Chamberlain, B.A., read a paper on the "Catawba Language."

He said the Catawba Indians dwelt in South Carolina, in the vicinity of the Woccons and Tuscaroras, inhabiting the district to the south of these. The language of the Woccons and that of the Catawbas appear to be nearly allied. Other than this the philological relations of the latter are somewhat uncertain. The object of the paper was to show the connection of the Catawba language with the Siouan family of speech, by comparison of vocabulary. Mr. Horatio Hale has shown from a vocabulary taken down from the lips of the last surviver of the Tutelos (a tribe who formerly dwelt in Carolina), that the language of these belongs to the Siouan stock. Rev. J. Owen Dorsey has shown that the whole of the Siouan tribes (Dakotas, Kansas, Omahas, Ottos, etc.) formerly dwelt east of the Mississippi. It seemed, therefore, considering certain remarkable coincidences in vocabulary, that a Siouan connection of the Catawba was most probable. From Rev. J. Owen Dorsey, the greatest of Siouan authorities, who had some years ago perceived the apparent coincidences in vocabulary, and who has examined with great care the large amount of Catawba linguistic material, obtained by Mr. Gatochet and others, in the library of the Bureau of Ethnology at Washington, the writer has since learned that the connection is still most doubtful. The failure to obtain from the grammatical forms and materials others than vocabulary, all of which have been subjected by Rev. Mr. Dorsey to a searching examination, must be given great weight. But the many coincidences of vocabulary remain as yet unexplained except by the theory of Siouan connection. The writer also noticed coincidences in vocabulary between the Catawba and the Choctaw-Muskogee and related languages. One of the most remarkable is the word for "buffalo," which, with local colouring, is the same in Catawba, Cherokee, Chicasaw, Choctaw and Muskogee.

Mr. F. F. Payne read a paper on "The Eskimo of Hudson's Strait."

FOURTEENTH MEETING.

Fourteenth Meeting, 18th February, 1888, T. B. Browning, M.A., in the chair.

Donations and exchanges since last meeting, 34.

A vote of thanks was passed to Dr. John Hall, Senior, for a donation of a shark's jaw, and a bottle of poisonous serpents and centipedes from the West Indies and South America.

Rev. C. J. S. Bethune, D C.L., and Rev. R. T. Nichol, were elected members.

Mr. Alan Macdougall read a paper on "The Water Temperatures of Lake Ontario," from observations made by him on 3rd September last, after a spell of very hot, dry weather.

W. A. Douglass, B.A., then read a paper on the " Study of Economics."

He commenced by asking, is the study of Economics of sufficient importance to demand a place in our educational institutions? We now have popular sovereignty, and on the intelligence of the people must depend the goodness of our government. He then called attention to many of the questions of an economic character that must be submitted to the people, and to aid the citizen in the proper solution of these questions our educational system does almost nothing. To show how disastrous such ignorance must be to a nation, he cited the experience of the United States at the time of the late war. Men could be had in abundance, but how to raise money in the best way was a pressing problem. The tax imposed on distilled spirits was taken as a sample of their method of taxation, and it was shown that it had the following defects :—1st, It increased the price and precluded its use in several industries into which it largely entered, thus destroying or sadly hampering these industries; 2nd, the increased price of that out of bond went into private pockets and not to the treasury, thus enabling one part of the people to collect taxes from another; 3rd, the increased price thus obtained led to conspiracies on the part of the manufacturers to have the tax increased for their own benefit; 4th, the evasion of the tax was easy. Thus, while the people had to contend against an open enemy in the field, they had to contend against a more subtle enemy at home, a harpy who took advantage of the necessities of the times to impose taxes for his own benefit. That enemy has survived the war and has fastened himself like a barnacle to the ship of state. The disastrous effect of interfering with the currency at the same time was noticed. Attention was then called to the most important question now pressing for solution—the growing obligations on society, not mutual, but one-sided. Every increase of ground-rent and of public debts means an increased burden thrown on one part of society. It was pointed out that in many cases those who had made the greatest sacrifice for society are those who by our present system of finance have increasing obligations imposed on them.

Mr. Houston asked in what way the teaching of the subject could be introduced into our public institutions of learning.

Mr. Douglass said the facts being presented to the students, all the teacher had to do was to show them how to correlate them. He gave an illustration how a class should be taught, showing them how with diminished toil there was an increase of wealth and at the same time a diminution of value, leading them to draw their own conclusions and reach the truth themselves.

Mr. Marling asked in what grade of schools he would have the subject introduced.

Mr. Douglass thought that the subject should be introduced into all the schools. He would have it form part of the instructions of every teacher.

Mr. Marling said the problem they had to encounter was the multiplicity of subjects that presented themselves and the selection of the most suitable for the purposes of public instruction.

Mr. Douglass thought that many useless subjects might be omitted, so as to leave time for the teaching of more profitable ones. A great deal that was useless in history could be dropped. He was in favour of banishing the teaching of spelling.

Mr. Armstrong gave an instance of a young girl aged about eleven struggling with the difficulties of physiology. He imagined that some social subject would be more useful.

Mr. Houston supposed that the difficulty could be got over by leaving it to the discretion of the teacher. He thought that the more obvious phenomena of economics could be easily introduced. He gave instances of such problems. Children of an early age could be made to understand them ; they are now entirely neglected.

Mr. Chamberlain was of opinion that the subject should be introduced only into the high schools. It would be more useful than teaching history and geography to such extremes as is at present the case. If these and others were modified there would be time for the study of Economics. He would like to know which was more important, a knowledge of the effects of the duties on sugar, or the location of some petty town in Siberia. Many of the pupils in our schools had a better knowledge of the geography of Russia than of the Dominion of Canada.

FIFTEENTH MEETING.

Fifteenth Meeting, 25th February, 1888, T. B. Browning, M.A., in the chair.

Donations and exchanges since last meeting, 51.

Mr. Charles Levy read a paper on "Capital."

He said capital is of two kinds, vital and separate, vital capital being the expectancy of the life, as it would be estimated by the usage governing the sale of life annuities ; separate capital being everything attaching to the life. The Creator of all things is the first and greatest capitalist. The earth is one of His instruments of distribution. Man drawing through the earth upon the Creator became a capitalist to the extent of his drafts. All men are capitalists, because all have drawn upon the earth, or upon those having the care of their early life. The capital so stored in men will produce good, bad or no return, according as it is used, or allowed to remain idle. The terms capital and labour are misleading, inasmuch as they do not explain the relationship between the persons to whom they are applied. The distinction is one of tense only, "Separate capital" being the exponent of past labour, "vital capital" the exponent of present labour. Vital capital is lent for a consideration to be paid in separate capital. Interest on vital capital (wages) is of the nature of a life annuity, the purchase price of which corresponds to the total "vital capital," upon which the interest (wages) is paid. Neither class of capital is productive, nor is it safe in the absence of the other. The employer borrows, the workman lends, vital capital. Both are capitalists, one producing present, the other expending past labour.

Mr. Douglass said that one difficulty in discussing the subject of capital arises from the ambiguity of the term. Perry in his Political Economy says, one of the characteristics of capital is its power of growth, thus a hundred of capital at five per cent. becomes two hundred in about fifteen years. But capital does not increase. Food is consumed, clothes wear out, machinery wears out. The one characteristic we can affirm almost universally of capital is that it does not increase, it diminishes. When Perry therefore says capital increases, he refers not to the capital, but to ownership. A similar ambiguity occurs in the writings of Bagehot when he says that capital is readily convertible. But we cannot convert wheat into iron, ships into stove, or railroad iron into overcoats. Capital is not convertible, but ownership is. Thus, before we can make any headway in discussing capital we must very closely distinguish the exact sense in which we use the term.

SIXTEENTH MEETING.

Sixteenth Meeting, 3rd March, 1888, the President in the chair.

Donations and exchanges since last meeting, 41, including four volumes presented to the Library by Dr. Scadding, for which a vote of thanks was tendered him.

The Secretary on behalf of Prof. George Lawson, Ph. D. LL.D., of Halifax, read a paper on "The Canadian Species of Picea or Spruce Firs," after which it was moved by Mr. Shaw, seconded by Mr. Browning, and carried, That the thanks of the Institute be tendered to Prof. Lawson for his valuable paper.

Mr. Chamberlain on behalf of Mr. J. B. Tyrrell, B.A., F.G.S., read a paper on "David Thompson, the Pioneer Geographer of the Northwest."

SEVENTEENTH MEETING.

Seventeenth Meeting, 18th March, 1888, T. B. Browning, M.A., in the chair.

Donations and exchanges since last meeting 37.

The Council reported the election of E. M. Morris and Harry Turner, as associates.

Robert H. Hedley and H. B. Proudfoot, were elected members.

The Secretary for Prof. J. W. Spencer, M.A., Ph. D., of Washington, read a paper on "The Iroquois Beach, a chapter in the Geological History of Lake Ontario."

Mr. G. E. Laidlaw, of Victoria Road, exhibited a number of specimens of Indian relics, consisting of pipes, arrow-heads, axes, gouges, chisels, needles, spear-heads and various other implements. After some remarks on the country in which the relics were found, viz., the west shore of Balsam Lake, he gave a description of the various articles and their uses.

EIGHTEENTH MEETING.

Eighteenth Meeting, 17th March, 1888, the President in the chair.

Donations and exchanges since last meeting, 51.

The Council reported the election of A. C. Barrett and C. H. A. Baird, as associates.

Mr. W. A. Douglass and Prof. Baker were appointed Auditors for the year.

After the sale of last year's periodicals Mr. J. A. Livingston read a paper on " Creation," in which he took the ground that the earth spoken of in Genesis was the dry land as contradistinguished from the seas. The word earth was never used to denote the whole globe until the sixteenth century. He proceeded to demonstrate mathematically several problems in connection with planetary and geological growths. He contended that coal was in a liquid state originally, and its formation the result of mineral rather than vegetable processes.

NINETEENTH MEETING.

Nineteenth Meeting, 24th March, 1888, the President in the chair.

Donations and exchanges since last meeting, 131, including 15 volumes presented to the Library by Henry Rowsell, Esq.

Prof. W. H. Ellis was appointed representative of the Institute at the sixth annual meeting of the Royal Society of Canada, to be held on the 22nd May.

TWENTIETH MEETING.

Twentieth Meeting, 31st March, 1888, the President in the chair.

Donations and exchanges since last meeting, 32.

John A. Morton and J. Castell Hopkins were elected members.

W. Houston, M. A., read a paper on "The Scientific Aspect of the Henry George Movement," of which the following is a synopsis:

He began by explaining that it was no part of his object to assail Mr. George's main contention, that the "unearned increment in land" should belong to the community and not to the individual owner. In that contention he concurred, so much so that he regarded it as an axiomatic truth. He further explained that it was no part of his purpose to depreciate Mr. George as a thinker or a philanthropist. He defended him against the charge of being a mere mischievous agitator, and appealed to his writings for proof. The mischief is done by intolerant critics who do not take the trouble to understand either the aims or the methods of such men as George, Powderly, or Parnell. Each of these men is a philosophical student of political science, prepared with reasons to convince others, and himself open to conviction. The object of the paper was to show that though Mr. George is right in his main contention the reasoning by which he supports it is unscientific and unsatisfactory. The same contention was put forward long ago by John Stuart Mill,* and an association was actually organized in 1870, † called the "Land

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* Richard Cobden stated the doctrine of the "unearned increment" in a public speech delivered on the 17th of December, 1845.

† Henry George's "Progress and Poverty" was written between August 1877 and March 1879, and the pamphlet, of which it is an expansion, appeared in 1871.

Tenure Reform Association," one object of which was "to claim for the benefit of the State the interception by taxation of the future unearned increase of the rent of land (so far as the same can be ascertained) or a great part of that increase, which is continually taking place without any effort or outlay by the proprietors, merely through the growth of population and wealth; reserving to owners the option of relinquishing their property to the State, at the market value which it may have acquired at the time, when this principle may be adopted by the Legislature." Mr. George's merit is that he has shown how the unearned increment in land can be appropriated by the community by a sound system of taxation, but he has needlessly weakened a strong case (1) by using words vaguely—a fault which he severely condemns in other writers; (2) by allowing himself to be influenced to some extent by considerations that belong not to sociology but to natural theology; and (3) by assailing certain economic doctrines which, properly regarded, not merely support his main thesis, but are absolutely necessary as a foundation on which it must rest. His position resembles that of a man who not merely draws a sound conclusion from wrong premises but actually goes to great trouble to demolish the right ones. This points to the probability of the conclusion having been suggested to him by circumstances, and of his having gone wrong in his search for reasons, and there is good ground to believe that this is the real history of his mental development. Henry George's "main contention" above referred to may be summed up in these propositions:

(*a*) There is an unearned increment in land in every progressive community;

(*b*) This unearned increment is caused by the growth of the community, and should belong to the community;

(*c*) A practical and equitable means of securing it for the community can be found.

This means is what Mr. George calls "taxation of land values," a kind of taxation which would be exemplified if our municipal assessment system were reformed by abolishing the tax (1) on income, (2) on personalty, and (3) on that portion of realty which is in its economic nature akin to personalty. Such a system of taxation is defensible alike on grounds of natural justice and political expediency, but with these political science has nothing to do. It is defensible also on purely scientific grounds, when we come to examine the origin of what is called the "unearned increment," and it is in this part of his case that Mr. George's reasoning breaks down. His argument tends to weaken his case, not to strengthen it, and he has in this way alienated support of a valuable kind from the movement which goes by his name, and the propaganda which he is actively promoting. That there is something wrong with Mr. George's reasoning is shown by the fact that John Stuart Mill, who maintained the wage fund theory and the Malthusian law, both of which Mr. George thinks it necessary in the interest of his case to refute, was as strong an advocate as Mr. George is of the appropriation by the community of the "unearned increment.*"

The lecturer before specifically criticizing portions of Mr. George's argument gave his own view of the origin of the unearned increment. The most striking class of phenomena which present themselves for economic investigation are those described by the term "exchange" or "barter." Things that have value exchange for each other in accordance with the law of supply and demand where competition prevails, and George correctly defines the law of competition to be the law of "least exertion." In an ideal competitive state each tries to get as much and give as little as possible, but in the actual state competition is limited by custom, by combination, and by the comparative immobility of capital and labor. In the true sense of the term "economic" non-exchanging parties are not proper subjects of economic investigation at all, and some of Mr. George's errors arise from his habit of going back to the conditions of primitive society for illustrations of the operations of our complex industrial community. As a matter of fact some economic principles of great importance do not emerge at all until industry becomes organized. Exchange of valuable articles for each other is conditioned on (1) transferability, (2) desirability, and (3) scarcity, and the first two being assumed the value will vary with the scarcity, or practically with the efficiency of productive agencies in overcoming difficulties. The productive agencies are (1) natural powers, described by the term "land," (2)

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*Since the above paper was read, Mr. Edward Atkinson, in the August number of the *Forum* has, while repudiating Mr. George's conclusion, concurred in his denunciation of Malthusianism.

capital, (3) enterprise, and (4) labor, the corresponding shares of the product being (1) rent, (2) interest, (3) profit, and (4) wages. These four agencies are differentiated from each other only in highly organized conditions of industry. The order in which the shares of the product are determined is the one just given, but the order in which they historically emerge is precisely the reverse. Mr. George's account of the matter is defective because he leaves out the agency of the *entrepreneur* and his corresponding profit. Other expounders of economic science do the same, but sometimes with less fatal effect on their systems. Mill identifies the *entrepreneur* with the capitalist and makes his "profit" part of the "profits" of capital under the designation of "wages of superintendence." Prof. Laughlin, the American editor of Mill identifies the *entrepreneur* with the labourer and his profit with wages. If the above account of the economic conditions of modern society be correct it is evident that Henry George's account is defective, and that much of his reasoning about rent, wages, and capital must be obscure, as indeed it is. Of his destructive criticism of the "wage-fund" theory it must be said: (1) That no one now holds it, if any one ever did, in the form which he criticizes; (2) that the "unearned increment" principle does not in any way depend on the wage-fund theory either in the form criticised by George or in any other form; (3) that the wage-fund theory, though nonsensical in the form he criticizes, is in a sense—and that a very important one—true; and (4) that the amount of truth in the wage-fund theory and the amount of truth in George's refutation of it depend entirely on the definitions given of "capital" and "labor." Even Mr. George expressly admits that capital may "limit the form of industry and the productiveness of industry, by limiting the use of tools and the division of labor," and this is equivalent to an admission of the existence of a wage-fund in Mill's sense of that term. F. A. Walker expressly defines "capital" as including "materials," "tools," and "subsistence." Capital accumulated and seeking investment often affects the rate of wages apart altogether from the productiveness of the labour it employs. Moreover, as Walker puts it, capital determines *when* wages will be paid, even if the product of the labour determines the amount of the wages.

More important in relation to the "unearned increment" principle is George's destructive criticism of the Malthusian law of population.

That law Mr. George thus summarizes : "The essence of the Malthusian doctrine is that population tends to increase faster than the power of providing food ;" and again : "The vital point is that there is a natural tendency and constant effort in population to increase beyond the means of subsistence ;" and again : "Population, constantly tending to increase, must, when unrestrained, ultimately press against the limits of subsistence, not as against a fixed but as against an elastic barrier, which makes the procurement of subsistence progressively more and more difficult, and thus, wherever reproduction has had time to assert its power, and is unchecked by prudence, there must exist that degree of want which will keep population within the bounds of subsistence." Each of these versions of the doctrine is substantially correct and is axiomatically true, and Mr. George himself admits that the doctrine was ten years ago "an accepted truth which compels the recognition even of those who would fain disbelieve it," he might have added "on grounds of natural theology." In reality the Malthusian principle is neither more nor less than a well-known biological fact which is as much the basis of Darwin's law of the "survival of the fittest" as it is of the doctrine of the "unearned increment." Darwin himself instances the elephant as the slowest breeder of all known animals, and yet, assuming one hundred years as the limit of its life, apart from violence, "after a period of from 740 to 750 years there would be alive nearly 19,000,000 elephants descended from the first pair." Man breeds more rapidly than the elephant, and under favorable circumstances a single pair will have, without twins, as many as thirty children. This is no phenomenal occurrence amongst the French people in Quebec, and families of over 20 children are very common. Mr. George's refutation of the law is no refutation at all, and his citation of the cases of China, India, and Ireland are not at all in point. On the contrary, each of these countries is a remarkable proof of the truth of the Malthusian doctrine. That doctrine, taken in connection with the law of diminishing returns from the application of labor and capital to land, is the basis of the Ricardian theory of rent, and also of Mr. George's doctrine of the unearned increment. The pressure of population on the means of subsistence would never have been felt but for the law of diminishing returns ; the operation of the law of diminishing returns would never have been noticed but for the pressure of population on the means of subsistence. These two facts are fundamental in sociology. They explain the migrations of mankind, and they explain why progress was made in methods of producing food and in the arts generally. So far from being in conflict with natural theology, they are amongst the most striking proofs of omniscience on the part of the Creator of society, for all sociological progress is conditioned on these two great principles.

Mr. Douglass said that while he concurred in the important conclusions arrived at by the speaker, there were matters of detail that might fairly be challenged. Professor Fawcett makes the statement that because there are three agents of production—land, labour, and capital—therefore we may assume that there should be three recipients of the product—the landowner, the capitalist, and the laborer. This the speaker characterized as being a most slovenly examination of one of the most important questions in the whole range of Economics, and atrociously illogical.

The term " land," as an agent of production, is very objectionable. The sun is an agent of production ; so is rain, and to include these under the term " land " is very misleading. Then what an absurdity to assume that the product is to be divided amongst the agents of production, for how can we give a share to the sun or the rain ? And then if it were true that each agent of production should receive a share of the product, in what way can we say that the mere appropriator of ground rentals is an agent of production. While Malthus had emphasized one fact in Economics, the speaker thought he sadly overlooked another still more important fact. It may be true that increased population drives population to poorer lands, and thus reduces production in one direction, namely, of agricultural products ; still it is not true that increased population diminishes the aggregate production. For, put a man in isolation on the prairie and he will be poor, however great the natural advantages. Give him a companion and the two will together produce more than twice the product of one. Thus product increases faster than population. But while product thus increases, ground rent also increases, whether as fast or faster than population the speaker was not prepared to say positively, but in some cases he mentioned the rental had increased much more rapidly than population. This rental at present, instead of being appropriated for community purposes, is taken by individuals and thus impoverishes the toiler. This latter fact, one of the most momentous in its effects on society is certainly not noticed as it should be by the exponents of the doctrines of Malthus.

Mr. Gerald Fitzgerald read a paper on "Miracles."

TWENTY-FIRST MEETING.

Twenty-First Meeting, 7th April, 1888, the President in the chair.

Donations and exchanges since last meeting, 42.

S. D. Mills was elected a member.

Alderman Harry Piper read some notes on zoology:

He referred to the collections of animals in ancient times, of which that made by Alexander the Great for his preceptor Aristotle was the first we have any account of. He then referred to modern collections. In addition to the great collections at London and Paris there were twenty-two others, some of which he had frequently visited. Mr. Piper then dwelt at some length on the value of zoological collections from various points of view. He pointed out some of the errors of early writers on natural history, which arose from the want of personal acquaintance with animals. Many of the scholars of our public schools know more of the habits of animals than some of those writers. He gave an account of the present state of the Zoo, which, though small, was in excellent condition, and enforced the importance of making it free to the public.

Mr. Bain read a paper by J. B. Tyrrell, B.A., F.G.S., of the

Geological Survey, entited "Catalogue of the Mammalia of Canada, exclusive of the Cetacea."

Mr. Chamberlain read a paper by Rev. John McLean, M.A., of Alberta, on "The Blackfoot Sun Dance."

Mr. A. Harvey referred to the similarity between the ceremonies described in the paper and some of the customs of the Greeks and Romans and our own ancestors.

Mr. T. B. Browning had seen one of these Sun dances by the Crees, a very large one. There were no less than ten or twelve chiefs and about 140 tepees. The ceremonies were substantially the same as those described by Mr. McLean. He saw four undergoing the torture. They were smeared with a white chalk clay. When strung up they rested wholly on the heel, and skipping round described about the third of a circle, the chiefs cheering them on. He witnessed another ceremony at the same time, that of adoption. A medicine man brought forward a little girl, crossed his hands over her, took her from her mother and handed her over to the man who adopted her. His informant, a half breed, told him that the medicine man called upon the gods to witness the rite.

TWENTY-SECOND MEETING.

Twenty-second Meeting, 14th April, 1888, the President in the chair.

Donations and exchanges since last meeting, 51.

Oliver R. Avison, M.D., was elected a member.

Mr. W. A. Douglass, B.A., read a paper entitled "A Scheme of Political Economy."

Mr. W. Houston, M.A., read a paper on "The Relation between Political Science and Practical Politics."

In order to comprehend this relation it is necessary to have a clear conception of what is meant by political science on the one hand and practical politics on the other. Political science, like the physical sciences, has for its function the investigation of phenomena with a view to ascertaining the general principles underlying and producing them. "Science" is not mere knowledge of facts; it is a knowledge of facts as explained by principles, or of principles as they explain facts. It is the part of chemistry to explain the phenomena of compound bodies, of geology to explain the facts of the earth's crust, of biology to explain the phenomena of life. So it is the part of political science to explain the facts and phenomena of organized political society. Moreover, the method of procedure is similar to that of the physical sciences. The facts of political society have to be analysed, classified, and made the basis of generalizations, just as the facts of the physical world are. The method by which political principles are reached from political facts is the inductive method, and when the connection is established between facts and principles, the work of the scientific investigator is done. It is no part of his function as a scientific enquirer to act as the adviser of the practical statesman, or attempt to show that a particular change either should or should not be made. When he does this he leaves the domain of political science and enters that of practical politics. His investigations may be the means of throwing light on the statesman's path, for sometimes the best way to ascertain in what direction we are drifting is to enquire how we have arrived at the point of observation; but to shed that light is no necessary part of the scientific enquirer's function. What has been done he may endeavor to explain; what ought to be done he is not called upon to decide or even suggest. This distinction between political science and political politics was illustrated by a number of instances selected from various departments of sociology. For example, the scientific enquirer may endeavor to get at a satisfactory explanation of the fact that in this and other countries the right of a person to issue promissory notes has been limited by legislation, so that only chartered banks can put such notes into circulation. It is the part of the practical politician to say whether any or what changes should be made in the laws which control and regulate the currency of the country; it is the part of the political scientist to search for the causes which have brought such a currency into existence and use. The practical politician may suggest improvements in our municipal institutions if he finds them not in his opinion perfect; the political scientist, as such, confines himself to tracing their growth and development under the operation of certain influences. It is the business of the practical politician to meet the growing needs of political society with new laws adapted to the situation; it is the work of the scientific politician to find out why our laws are such as they are. And so on through a wide range of topics which might be cited. If it be objected to this view of political science that it is too narrow, the obvious reply is that to give the term "science" Comte's meaning makes it impossible to apply it at once to the physical and to the historical sciences. It is possible in the region of physics to foretell with certainty future events; it is not possible in the region of history. It may be replied further, that even on this narrow view of it political science is extremely important for two reasons: (1) because it affords one of the best possible intellectual trainings, and (2) because though political science, as such, does not aim at sociological improvement, the scientific study of politics cannot but suggest to the mind of the student improvements that in the way of practical politics should be made. Moreover, the prosecution of such studies has a humanizing effect on the student. No other discipline approaches this in its value as a means of counteracting the mischievous efforts of political partizanship with its exaggerations, its prejudices, its hypocritical praise and equally hypocritical blame, its condemnation of opponents without regard to what is commendable, and its condonation of the errors and even the crimes of friends.

TWENTY-THIRD MEETING.

Twenty-third Meeting, 18th April, 1888, the President in the chair.

Mr. T. B. Browning, M.A., read a paper on "The Chamberlain Treaty, 1888."

TWENTY-FOURTH MEETING.

Twenty-fourth Meeting, 21st April, 1888, the President in the chair.

Donations and exchanges since last meeting, 45.

Herbert C. Jones was elected a member.

Mr. George Martin Rae read a paper on "Should the Priviledge of Making Wills be Restricted?"

Mr. Rae pointed out that the law relating to wills was constantly undergoing modification. That originally a man had only power to bequeath one-third of his personalty, the other two-thirds devolving on his wife and children respectively; that even yet the wife had the right to elect whether to take the provision by will or not in the case of real estate. That marriage revoked a will but imposed no relative duties as to any disposition of the married person's estate, and suggested that the absolute power to bequeath should be to some extent restricted in favor of husband, wife, parents and children, as had been done in 1859, when married women were permitted to make wills. He suggested that the right of sick and aged persons to make wills was of doubtful value; believed that the true intention of the testator often failed to be expressed, and that the precautions required by law only extended to the signature of the document, not to the knowledge of the contents. That at present the sick and feeble were exposed to the risk of persecution. He suggested that it was a proper subject for scientific enquiry whether the disposing mind existed in the majority of such cases, which his experience led him to doubt

Mr. Horatio Hale, of Clinton, read a paper on "The Developement of Language."

In answer to a question from Dr. McCurdy relative to the origin of inflections, Mr. Hale said that he had already in part answered it, mankind have never invented inflections. We have no authority for any inflections having been invented.

If one person had invented a new inflection, it could not be possible that any others would adopt it.

In answer to a question from Mr. Harvey on the connection of a language rich in inflections with a highly advanced state of civilization, Mr. Hale said that he had explained his views in a paper on the subject. The attainment of a highly inflected language does not depend on the degree of civilization. It had a good deal more to do with the character of the people than with their attainments in civilization.

TWENTY-FIFTH MEETING.

Twenty-fifth Meeting, 28th April, 1888, the President in the chair.

Donations and exchanges since last meeting, 43.

A letter was read from Dr. Selwyn, Director of the Geological Survey of Canada, relative to a statement reported on page 191 of the last volume of the Proceedings as attributed to him by Mr. W. H. Merritt, which statement he declared to be absolutely and wholly untrue ; also a letter from Mr. Merritt, denying the correctness of the report of his remarks.

Nominations for Officers for the ensuing year were then made.

Captain Stupart, R.N., read a paper on " Whence did the Scandinavians obtain their Knowledge of the Compass ? "

This question cannot be limited to the marine compass, for the " magnetic car " appears to have been invented about the same time. The first mention of the magnet in China was in A.D. 121. On Chinese vessels the use of the compass was first made in A.D. 419, and the " magnetic car " in the Island of Japan in the seventh century. The Arab ships used the needle in India in A.D. 1117; European chronology gives its introduction about A.D. 1200; Odin's supposed migration to Scandinavia, B.C. 50; conquest of Samarcand by the Arabians, A.D. 712; discovery and settlement of Iceland, A.D. 861; Arabs trading with caravans between Pekin, Samarcand, Kazan, Novgorod and Varangia, about A.D. 860. After their first settlement the Governor of the Icelanders was sent each year to form new or improve the old laws, A.D. 861. It is probable that the Arabs brought the compass from China to Novgorod, where it was transferred to the Varangians, who passed it on to Iceland and the Faro Isles.

Mr. David Spence read a paper on "Peculiarities and External Relations of the Gaelic Language."

The writer of the paper noted the curious fact that until lately there has been scarcely an instance of a Saxon whose curiosity had been excited to know something about the language of the Gael, which was one of the most important branches of the old Aryan speech and nearer the old forms than any other European language. Having referred to a few peculiarities of the Gaelic language, traceable to a peculiarity in the mode of thought, Mr. Spence cited examples of beliefs and customs indicative of the bent of mind of the Keltic people; and gave a large number of Aryan forms of words which have been accurately preserved by the Gaelic-speaking people. The importance of Gaelic for philological purposes could not, he said, be over-estimated. The various branches of the old Aryan race, both in Asia and on the Continent of Europe, had been so disturbed and mixed that the languages must necessarily have been greatly changed and broken up, while the people in the Highlands and in Ireland had been so isolated that their branch of the old language had been, as it were, bottled up, sealed and preserved for the use of the philologist. Words changed but little when spoken by the same race, but when pronounced by alien lips they might change so as not to be recogized. The names Dumbarton and Sterling, in Scotland, concealed their meaning when pronounced by Englishmen, but when pronounced by the Gaul they were still "Dunbreaton," the Briton's Fort, and "Struithlia," the rock stream. The Gaelic system of orthography was so different from the English that English scholars had been deterred from studying it, but it was to be hoped they would follow the example of the German and take a share in the honour of working a mine so interesting though long neglected.

Mr. Chamberlain read on behalf of the author, a paper by Mr. John C. McRae, of Port Colborne, on the "Geological Formation at Port Colborne as shown by drilling for Natural Gas."

Commencing at a spot twelve feet above Lake Erie level, the writer gave a minute and valuable description of the strata penetrated by the drill. Permanent water was found at 26 feet, salt water at 452 feet; a fair flow of gas at 454 feet, with a stray odor of sulphuretted hydrogen. At 764½ feet the present supply was found, which is almost odorless. The well was drilled to 1,500 feet, but there was no increase in the quantity of gas. The accurate flow of the well has not been estimated, but on its being closed for seven hours, the hydraulic gauge registered 275 pounds, and was still going up. The gas is used for light and fuel and gives satisfaction.

A paper by A. F. Chamberlain, on the "Mississauga Language," was read by title.

THIRTY-NINTH ANNUAL MEETING.

Thirty-Ninth Annual Meeting, 5th May, 1888, the President in the chair.

Donations and exchanges since last meeting, 41, including a box of minerals from Dr. Hall, for which a vote of thanks was tendered him.

The Council reported the election of Murray A. White, as an associate.

A. B. Eadie, M.D., was elected a member.

The following reports of sections were read and adopted :

I. Architectural Section.

TORONTO, April 10th, 1888.

The Architectural Section of the Canadian Institute have the honor to present their Second Annual Report :

Since our first report to the Canadian Institute we have held weekly meetings during the winter months, closing the first session of our existence on May 9th, 1887, and commencing the session of 1887-88 on October 11th.

The following papers and addresses were delivered before this section during the past year:

April 4th, 1887, Mr. C. F. Wagner read a paper on "Carpentering."
April 11th, " Mr. J. W. Gray read a paper on "The Doric Temple in its Constructive Aspect."
May 2nd, " Mr. Curry gave an address on "Plumbing," illustrated by drawings, showing correct and defective work.
Jan. 17th, 1888, Mr. M. J. Hynes gave an address on the subject of "Terra Cotta."
24th, " Mr. Frank Douglas read a paper on "Renaissance Architecture."
31st, " Mr. J. B. Vick gave an address on "Stone Cutting and Stone Setting."
Feb. 7th, " Mr. A. G. Gregg, read a paper on "Architectural Lessons from the Human Figure."
14th, " Mr. Jas. Wright gave an address on "Plastering."
28th, " Mr. Wm. Simpson gave an address on "Joinery."
Mar. 20th, " Mr. R. J. Hovenden gave an address on "Painting."
27th, " Mr. R. J. Hovenden gave an address on "The Manufacture, Adulteration and Application of Colors."

Apr. 10th, 1888, Mr. Wm. Phillips gave an address on "House Drainage."

The Officers for the ensuing year are :—Chairman, A. F. Wickson ; Vice-Chairman, R. Dawson ; Treasurer, C. D. Lennox ; Secretary, J. F. Brown ; Committee of Management, John Howard and G. F. W. Price.

ROBERT DAWSON,
Chairman.

2. Biological Section.

TORONTO, 21st April, 1888.

The Council of the Canadian Institute.

The Biological Section of the Canadian Institute have held their regular meetings on the 1st and 3rd Mondays in every month during the past session. At each of these meetings one or more original papers have been read on a variety of topics, as may be seen on reference to the programmes issued.

The "Microscope Fund" has through the liberality of a few members and their friends been sufficiently augmented to allow of the purchase of a first-class instrument, now expected to arrive in a few days.

Yours faithfully,
W. E. MIDDLETON.

SCHEDULE OF PAPERS READ IN BIOLOGICAL SECTION 1887–8.

May	2,	1887,	"The English Rabbit as an Agricultural Pest,"	William Brodie.
	16,	"	"The Fresh Water Hydra,"	W. E. Middleton
			"The Coleoptera of the N. W. T,"	Wm. Brodie
June	20,	"	"The Acclimatization of the English Goldfinch	Wm. Brodie
Oct.	3,	"	"Canadian Ants,"	Wm. Brodie
	17,	"	"Canadian Gall Insects,"	Wm. Brodie
Nov.	7,	"	"Foreign Ants,"	W. E. Middleton
	21,	"	"Hyphantria Cunea,"	Wm. Brodie
Dec.	5,	"	"The Brownian Movement,"	W. E. Middleton
			"Mind in Animals,"	Wm. Brodie
			"The Calamorpha Moth,"	Wm. Brodie

19, 1887,	"Canadian Reptiles,"	J. B. Williams
Jan. 16, 1888,	"Planorbis Corpulentus,"	Wm. Brodie
	"Some Canadian Insects,"	Wm. Brodie
Feb. 6, "	"Birds Eggs,"	E. V. Rippon
	"Museum Collections and their Preservation,"	C. Armstrong
	"Certain Alleged Digestive Glands of Carnivorous Plants,"	W. E. Middleton
	"The English Sparrow,"	Dr. Garnier
20, "	"Chloroform,"	Wm. Brodie
Mar. 5, "	"Coleoptera of the N. W. T., No. 2	Wm. Brodie
April 2, "	"Habits of Canadian Birds,"	E. E. Thompson
16, "	"The Echini,"	Rev. K. F. Junor

(22 papers.)

The Officers for the ensuing year are:—James H. Pearce, President; W. E. Middleton, Secretary.

3. Geological and Mining.

The President read the following:

TORONTO, April 26, 1888.

REPORT OF THE GEOLOGICAL AND MINING SECTION OF THE CANADIAN INSTITUTE FOR THE YEAR 1887–8.

This section of the Institute was organized at a meeting held on the 20th of April, 1887, and its Regulations and By-Laws were approved by the Council on the 30th of the same month. The names of sixteen members of the Institute are enrolled on the minute book as members of the section.

Besides the inaugural meeting, six meetings of the section have been held during the year. The attention of the section was called soon after its formation to the want of statistics and other trustworthy information relating to the mining and metallurgical operations carried on in the Dominion, and the desirableness of the public being put in possession of such information as soon after the close of each year as possible. A memorial setting forth these views was prepared by the section, approved by the Institute, and forwarded to the Dominion Government in May of last year. In answer to this memorial the Government replied on the 28th September, that an Order-in-Council was passed creating a division of the Geological Survey to attend to these matters. Furthermore, in reply to an interview had with the Deputy-Minister of the Interior by an authorized sub-committee of the section, consisting of the chairman and secretary, the Minister stated: (1) That the officers of the division referred to have been appointed; (2) That the publication of statistics and information by this division will hereafter be much more prompt after the close of each year than hitherto; (3) That the Dominion Government has co-operated and will co-operate with the Provincial Governments in the direction of acquiring mining and metallurgical information; and (4) That the Government is considering the publication of all reports of the Geological Survey relating to mining and metallurgy in Canada since 1863 in connection with the work of the forthcoming census.

A select committee of the section has also prepared an exhaustive report, with tables of exports and imports, on the minerals and raw metallurgical products of the United Kingdom, the United States, Canada and the other Colonies of the Empire, more especially in regard to the trade of the several countries with each other.

In addition to the foregoing work accomplished by the section, papers were read at the several meetings as follows:

1. "On the Mineral Production of Canada in 1886-7," by Wm. Hamilton Merritt.

2. "On Iron and other Ores of Ontario," by James T. B. Ives.

3. "On certain Lacustrine Deposits and their Economic Values," by Arthur Harvey.

4. "On the Physical Aspects of Iron Smelting," by Samuel D. Mills, of St. Ignace, Michigan.

5. "Notes on Thunder Bay Silver Ores," by Robert B. Headley, of Port Arthur.

6. "Notes on New Jersey Iron Ores," by Wm. Hamilton Merritt.

Two Officers elected at the organization of the Section, viz.:

Alexander McNabb, Vice-Chairman; and J. T. B. Ives, Curator, having resigned in consequence of leaving the country, their places were filled by the appointment thereto of Arthur Harvey and David Boyle, respectively.

The following Officers of the Section have been elected for the Institute year, beginning May 1, 1888:

Chairman, William Hamilton Merritt; Vice-Chairman, Arthur Harvey; Secretary, A. Blue; Executive Committee, John Notman, A. Elvins, R. W. Phipps, Dr. P. H. Bryce and A. F. Chamberlain.

A. BLUE,
Secretary.

RESOLUTION adopted unanimously by the Geological and Mining section of the Canadian Institute, at Toronto, on the 26th April, 1888.

Whereas, the late Hon. Thomas White, Minister of the Interior, for years recognized the importance of the mineral and metallurgical interests of the Dominion of Canada, and previous to taking office in the Government ably advocated through the press the desirability of more attention being paid to their development; and whereas, since taking office he has reorganized the Geological Survey so that a division of it may accomplish a practical utility in keeping a record of mining and metallurgical development in Canada, and has also made important and beneficial changes in our mining laws; Be it resolved, that, while expressing the most profound sorrow at his death, the Geological and Mining Section of the Canadian Institute desire to bear record to the great benefits accomplished by the deceased during his short term of office to the mineral interests of the Dominion of Canada; and that a copy of this resolution be forwarded to his son, Mr. Robert White.

4. Philological.

TORONTO, April 7, 1888.

The Council of the Canadian Institute:

GENTLEMEN,—In accordance with the constitution of the Canadian Institute I beg to submit the following report of the work of the Philological Section for the year ending March 31, 1888:

The number of members on the roll is eighteen. Since the 31st March, 1887, the section has held eleven meetings. Since December 13, 1887, the meetings of the section have taken place at twenty o'clock on the second and fourth Tuesdays in each month of the session of the Institute.

At the meeting of November 14, 1887, it was decided that the Section should take up the study of "Phonetics," and the work of the members has to a great extent been the pursuance of such study.

At the meeting of January 10, 1887, Mr. George E. Shaw, B.A., resigned the position of Secretary of the Section, to which office Mr. A. F. Chamberlain, B.A., was appointed.

During the year the following papers have been read before the Section, viz.:

(1) April 11, 1887, "The Science of Language in Popular Education," by the Rev. J. F. McCurdy, Ph. D.

(2) 25, " "Umbrian Inscriptions," by the Rev. Dr. McNish.

(3) May 9, " "An International Alphabet with a System of Shorthand," by M. L. Rouse.

(4) Dec. 13, " "The Organs of Speech, with Special Reference to the Production of Speech in the Larynx," by Dr. G. R. McDonagh.

(5) Jan. 10, 1888 "Throat Sounds," by the Rev. J. F. McCurdy, Ph. D.

(6) 24, " "Portuguese Nasal Sounds," by G. E. Shaw, B.A.

(7) Mar. 27, " "A Contribution to the Study of the Franco-Canadian Dialect," by Jno. Squair, B.A.

(Signed)
A. F. CHAMBERLAIN,
Secretary Philol. Sect. C. I.

TORONTO, April 7, 1888.

ADDENDA.—Since the above report the Section has held two meetings at which the following papers were read:

(8) Apr. 10, 1888, "A Chart of Elocution," by T. B. Browning, M.A.

(9) 24, " "Volapük, the New World-Language," by D. R. Keys, B.A.

(10) 24, " "On some Words of Indian Origin, in the Dialect and Literature of Quebec," by A. F. Chamberlain, B.A.

At the meeting of April 24, the following officers were elected:—Chairman, Rev. J. F. McCurdy, Ph. D.; Vice-Chairman, D. R. Keys, B.A.; Secretary, A. F. Chamberlain, B.A.; Ex. Committee, H. R. Fairclough, M.A., W. H. VanderSmissen, M.A., John Squair, B.A., W. H. Fraser, B.A., G. E. Shaw, B. A., and W. H. Huston, M.A.

A. F. C.

The Report of the Chairman of the Photographic Section was read and referred to the Council.

The President read the following:—

ANNUAL REPORT OF THE COUNCIL OF THE CANADIAN INSTITUTE SESSION, 1887-88.

The Council of the Canadian Institute have the honour to lay before the Members their Thirty-Ninth Annual Report:

Early in the past Session the President, Mr. W. H. VanderSmissen, to whose exertions so much of the increased activity and prosperity of the Institute was due, was unfortunately obliged, through the pressure of other duties to resign, and the Vice-President being at the time absent in Europe, Mr. Charles Carpmael was elected to fill the vacant position.

Twenty-six meetings including the annual conversazione, have been held during the past session, at which thirty-nine papers have been read in addition to fifty read at Section meetings. The aggregate number of papers read thus exceeds by seventeen that of the preceding year, when there were but seventy-two, and this number was again largely in excess of that in any previous year in the history of the Institute. The character of these communications has been fully equal to the standard of previous years, and the range of subjects (as shown in the appendix) has been unusually large. The average attendance at the regular weekly meetings has also shown an increase. It is also satisfactory to notice that there has been a considerable increase in the number of members who have made use of the reading room.

On the occasion of the annual conversazione the Museum of Natural History and Archæology was opened, and there was an excellent exhibition of photographs by the Photographic Section. There was a large attendance of members and their friends. The Archæological collection is already extensive, and has been admirably arranged by the Curator, to whom the Institute is greatly indebted for his exertions, both in collecting specimens and in carefully classifying them. The Archæological Report, which has been bound up with the Annual Report of the Institute for the year 1886-87, is already in the hands of the members, and contains an account of what had been done by the Institute down to December last, in this field.

Our exertions to add to our collection continues unabated, and the Council have thankfully to acknowledge the grant of $1,000 by the Ontario Government, which will enable us to devote a considerable sum, as in the past year, to this purpose.

The number of books and pamphlets received during the year is shown in Appendix III, to have continued to increase, and to have been considerably more that eight times as large as it was five years ago.

A pamphlet has been prepared by Mr. Sandford Fleming on the subject of "Time Reckoning," and issued by the Institute, for the purpose of introducing the subject, in the educational institutions throughout the Dominion. In this pamphlet the principles of time-reckoning are set forth, with special reference to the recommendations of the Washington conference on the subject. A deputation of the Council of the Institute have waited upon the Minister of Education of the Province of Ontario, and acting on the recommendation of this deputation, the Minister has requested to be furnished with five hundred copies of the pamphlet for distribution to the head masters of the various high schools and collegiate institutes in the Province. The Council have also sent copies of the pamphlet to the Ministers of Education in the other Provinces.

It will be remembered that it was a paper by Mr. Sandford Fleming, read before this Institute, copies of which were forwarded with a memorial from the Institute to the Marquis of Lorne, then Governor-General of the Dominion of Canada, and through him to the British Government, and to various foreign scientific institutions, which first called prominent attention throughout the world to this subject. The views then advanced by Mr. Sandford Fleming, were very generally accepted by scientific men in all civilized nations, the subject was discussed at various congresses, and in October, 1884, a conference was held at Washington on the invitation of the President of the United States, at which twenty-five nations were represented, and the proposed reforms were by it recommended for adoption by all nations. Your Council have every reason to hope that the pamphlet now issued will facilitate the introduction of these reforms in Canada.

A memorial was also forwarded to the Minister of the Interior in connection with Geological and Mining affairs, and in reply a certified copy of a report of a committee of the Honorable the Privy Council, approved by His Excellency the Governor-General in Council on the 28th September, 1887, has been received, in which it is set forth that a Division of the Geological Branch of the Interior has recently been organized by the appointment to the permanent staff of the Survey of a Mining Engineer and a Mining Geologist to examine and report upon the mining industries of the Dominion, to collect mineral statistics, and otherwise to work out the economic geology of our mining districts.

While congratulating the Institute on the increase in membership and activity, the Council feels it necessary to impress upon the members that much has yet to be done in the direction of the further extension of the Museum and Library. Our accommodation in these is still inadequate, and additional shelving and cases are required.

The balance shewn on our balance sheet is already expended. It therefore urges upon the members the necessity of supporting the present efforts of the Committee of Ways and Means by every means in their power, by contributions, by presenting the claims of the Institute to the public in every possible way, and by endeavoring to obtain new members.

During the past year the Institute has lost by death one of its most distinguished honorary members, Prof. Balfour Stewart, of Owen's College, Manchester. Balfour Stewart's name was first prominently brought before the public by his researches on radiant heat, published in 1858. In 1859 he was appointed Director of Kew Observatory, and held this post until 1870, when he was appointed Professor of Physics at the Owen's College, Manchester. He died of apoplexy on December 18, 1887.

CHARLES CARPMAEL,
President.

On motion of Mr. Browning, seconded by Mr. Noble, the report was received and adopted.

The election of officers for the ensuing year resulted as follows:

President, Charles Carpmael, M.A.; Vice-President, T. B. Browning, M.A.; Secretary, Alan MacDougall, M. Inst. C.E.; Treasurer, James Bain, Jr., Esq.; Editor, George Kennedy M.A., LL.D.; Librarian, George E. Shaw, B.A.; Curator, David Boyle, Ph. B.; Members of Council, Alex. Marling, LL.B., W. H. Ellis, M.A., M.B., W. H. VanderSmissen, M.A.

On motion by Mr. Browning, seconded by Dr. Kennedy, it was resolved, "That the thanks of this Institute are due to the newspapers of the City of Toronto for the space which they have so freely given to proceedings of the Institute during the year, and especially to the *Mail* newspaper, for the extended notices of the meetings which have so regularly appeared in its columns."

On motion by Mr. Pearce, seconded by Mr. Pursey, it was resolved, "That a special vote of thanks be tendered to Mr. W. H. VanderSmissen, M.A., the late President, for the interest he has always taken in the affairs of the Institute, and his active exertions in its behalf, which have contributed so largely to its prosperity."

Votes of thanks were also passed to the retiring Officers, the Assistant-Secretary and the Auditors.

APPENDIX I.

Number of Members April 1, 1887	**290**
Withdrawals and deaths during the year	**27**
	263
Elected during the year	**56**
Total members April 1, 1888	**319**
Composed of :	
Honorary Members	**6**
Life Members	**12**
Ordinary Members	**301**
Total	**319**
Associates	**54**

APPENDIX II.

TREASURER IN ACCOUNT WITH THE CANADIAN INSTITUTE FOR THE YEAR ENDING MARCH 31ST, 1888.

To Summary:—

“ Balance on hand	$ 56	40
“ Annual Subscriptions	909	75
“ Rents	206	50
“ Government Grant	1000	00
“ Journals sold	7	15
“ Periodicals sold	38	80
“ Donation	2	50
“ Interest	1	14
“ Proceeds of Note	200	00
	$2422	24

By Summary:—

“ Salaries	$ 314	00
“ Printing Journal	813	27
“ “ Miscellaneous	59	00
“ Stationery	2	00
“ Postage	78	85
“ Freight and Express Charges	13	53
“ Repairs	36	64
“ Gas	40	75
“ Water	24	00
“ Periodicals	120	76
“ Furniture	11	15
“ Housekeeping	43	80
“ Fuel	20	75
“ Insurance	52	00
“ Blinds	10	00
“ Gas Lights	19	20
“ Taxes	9	75
“ Journals purchased	2	50
“ City Directory	3	00
“ Chemicals for Museum	8	53
“ Grant to Photographic Section	40	00

APPENDIX II.—*Continued.*

" Sundries	8 00
" Interest	218 00
" Promissory Note	300 00
" Balance, Imperial Bank	163 56
" " on hand	9 20
	$2422 24

Bank Balance as per Bank Book		$ 273 67
Balance as above	$163 56	
" from Building Fund	110 11	
		$ 273 67

(Signed) W. A. Douglass, Alfred Baker. } *Auditors.*

BUILDING ACCOUNT.

1887.			
April 1,	To Balance		$ 662 83

1887.			
April 29th,	By Carpenters Contract, Certificate No. 3,.		$ 32 75
May 5th,	" Painters " " " 1,.		113 40
Nov. 18th,	" Plasterers " " " 1,.		41 80
Oct. 16th,	" Roofers " " " 1,.		25 00
May 17th,	" Contract for Cases	$ 50 00	
Oct. 24th,	" "	75 00	
	" "	100 00	
Nov. 16th,	" "	65 98	
			290 98
Dec. 16th,	" Law Expenses,		3 64
1888.			
Jan. 13th,	" Carpenters Account for Alterations and Shelves		45 15
	" Balance in Imperial Bank		110 11
			$ 662 83

Examined and found correct.

(Signed) W. A. Douglass, Alfred Baker, } *Auditors.*

APPENDIX II.—*Continued.*

ASSETS.

Building	$ 11,500 00
Warehouse	720 00
Ground	3000 00
Library	5500 00
Specimens	2000 00
Personal Property	1000 00
	$ 23,720 00

LIABILITIES.

Mortgage No. 1, due 1892	$ 3000 00
" 2, " 1892	1000 00
Note discounted	200 00
Balance in favour of the Institute	19,520 00
	$ 23.720 00

APPENDIX III.

Donations and Exchanges.—Books and Pamphlets received from April 1st, 1887, to April 1st, 1888 :—From Canada, 229 ; United States, 503 ; Great Britain and Ireland, 466 ; India and Australasia, 90 ; all other countries, 1,045. Total, 2,333.

Total number received in 1882-3, 280 ; in 1883-4, 800 ; in 1884-5, 730 ; in 1885-6, 1,502 ; in 1886-7, 2,230 ; in 1887-8, 2,333.

APPENDIX IV.

The number of Societies and Publications with which the Institute exchanges is 396.

APPENDIX V.

The Periodicals subscribed for are the same as last year, with the addition of the *Amateur Photographer.*

APPENDIX VI.

Classification of papers read by subjects :—Anthropology, 3 ; Archæology, 1 ; Biology, 2 ; Botany, 1 ; Chemistry, 1 ; Economics, 4 ; Geology, 4 ; Geography, 2, Jurisprudence, 1 ; Medicine, 1 ; Metallurgy, 1 ; Meteorology, 1 ; Philology, 4 ; Political Science, 3 ; Psychology, 1 ; Sociology, 1 ; Solar Physics, 1 ; Telegraphy and Telephony, 1 ; Zoology, 4 ; Miscellaneous, 2. Total 39.

Read at Section Meetings :—Architectural Section, 12 ; Biological Section, 22 ; Geological and Mining Section, 6 ; Philological Section, 10. Total 50.

SOCIOLOGICAL CIRCULAR.

SIR,—The Canadian Institute is desirous of collecting and incorporating in its PROCEEDINGS reliable data respecting the political and social institutions, the customs, ceremonies, beliefs, pursuits, modes of living, habit, exchange, the devolution of property and office which obtain among the Indian peoples of the Dominion, and of enlisting your voluntary coöperation in the work. It feels that this department of research has not been so fully cultivated in Canada as its importance demands, fears that the opportunity of gathering and carefully testing the necessary facts may with the advancing tide of European civilization soon pass away, and is of opinion that much light may be cast upon the genesis and growth of government as well as upon legal, sociological and economic thought by an accurate study of our Indian tribes in their existing conditions and organizations. Contributions to the philology of the Indian tongues and additions to their folk- or myth-lore will be welcomed as heretofore. At the same time the Institute begs leave, without desiring to contract the field of observation, to direct your attention to the following matters :—

(1.) The basis of family or tribal organization, *e.g.*, whether it be purely personal, or partake to any extent of territorial attributes ; the received mode of ranking and tracing relationships, paternal, maternal, or both ; with a table of degrees, if possible, of agnates and cognates :

(2.) Adoption, its kinds, ceremonies and formulæ, the extent of its use, and the particulars in which it modifies, the family, gens, tribe, etc. :

(3.) The rules and practice which govern the contracting, maintaining and dissolving of marriage ; the degrees of prohibition ; exogamy and endogamy ; the effect of marriage on the status of woman, her position upon divorce, etc. :

(4.) Grades of persons of both sexes apart from office, free and slave ; to what extent mature children of either sex are the subjects of rights ; the age of enfranchisement, if any :

(5.) The character of parental power, paternal and maternal ; its extent over persons and property in matters civil and criminal; exceptions to it:

(6.) Offices, their kinds, the powers annexed to them, the terms for which and on which they are held; the mode of succession, *e.g.*, general election, election by a few, election within a group, inheritance, etc.:

(7.) Assembles or councils and the questions treated at them; how and by whom they are summoned; in whom resides the right of debate and franchise in the several assemblies of the family, gens, band, tribe, or nation:

(8.) Property, its admitted classes inside the family and tribe; joint proprietorship how acquired, held, managed, aliened; whether common ownership is acknowledged, and in what respects it is distinguished from joint ownership; whether private property is allowed; if so, how acquired, enjoyed, transferred, or lost; whether succession to it is permitted; if so, within what degrees; if not, how it is disposed of, *e.g.*, buried with body on death of owner, burnt, or otherwise destroyed:

(9.) Division of labor and duty, civil and military, and how apportioned, *e.g.*, to chiefs, sub-chiefs, ordinary male members, ordinary female members, immature children; methods and extent of production, modes and measures of distribution, the means of support of family or tribe, the interior economy of family and gens or band; the modes of bargain and sale in use; by whom conducted; the use of gifts:

(10.) The settlement of disputes or conflicting claims as between *(a)* members of same sub-family, *(b)* family, *(c)* different families or sub-families, *(d)* bands, groups or gentes, *(e)* tribes, *(f)* nations; in whom resides the civil and in whom the criminal power, by tradition or custom; how and by whom dooms are pronounced and inflicted; whether punishments as between the tribes are corporate or individual; the compounding of crimes and offences, *e.g.*, murder, theft; to what extent the bond of blood-feud binds; ostracism, surrender of offender, death penalty; in what cases practiced; the effect of vows upon the performance of contract:

(11.) The making of inter-family and inter-tribal arrangements, *e.g.*, treaties as to boundaries, peace and war, sale and purchase; the solemnities observed among larger and smaller groups:

(12.) The cultus and sacrifices which obtain in sub-families, families, totem, etc.; moral or religious code which accompanies them; the form and purpose of the different tribal or inter-tribal ceremonies in use, *e.g.*, dog-, sun-, thirst-dance, etc.:

(13.) Death and birth rates; effects of miscegenation:

(14.) Practice in cases of burial, its rites:

(15.) Border civilization, its effect upon the beliefs and moral conduct of Indian peoples:

(16.) The influence of territorial reserves, outside jurisdiction, education and support upon the Canadian Indians:

The Institute will be happy to receive and give its best attention to papers upon any and all the above, or such other subjects allied to them as may seem to you important.

It would appear from reports published in the newspapers that in the Province of Ontario, in the other Provinces and the Territories of the Dominion, a considerable quantity of valuable information concerning our Indian peoples is reduced to writing, but is not given to the world because no proper channel has been established for its dissemination. This Institute desires to draw these scattered rays to a focus for the benefit of students at home and abroad; and believes that investigators will find in its PROCEEDINGS (now circulating among members in Canada, 300, foreign societies and institutes, 400,) that avenue of communication of which they have been so long in need. Proprietary rights in the papers may be reserved.

For some years the Institute has given special attention to collecting and classifying specimens of natural history, geology, and Indian archæology which, according to the custom of the Institute, are duly inscribed with the names of the donors. Its museum includes many very rare and valuable specimens which are open for inspection and study every lawful day from 1 p.m. to 6 p.m. It is the desire of the Institute to increase its collection in all departments, enhance its public usefulness and render it worthy of the Dominion as a national institution. Through the liberality of the Canadian Pacific Railway

Company, the Institute is enabled to make announcement to donors and intending donors that specimens for the museum will be carried over the Company's line free of charge in packages suitably packed for freight.

It is particularly requested that packages of specimens for transmission by rail, papers, abstracts, communications in or pertaining to the matters of this circular be directed to

The Chairman of
THE SOCIOLOGICAL COMMITTEE,
Canadian Institute,
46 Richmond Street East,
Toronto, Ont.

CHARLES CARPMAEL, M.A., F.R.A.S., F.R.S.C., *President.*
GEORGE KENNEDY, LL.D., *Editor.*
ALEX. MARLING, LL.B.
T. B. BROWNING, M.A., *Vice-President, Chairman of*
Sociological Committee.

Toronto, June, 1888.

CATALOGUE OF THE MAMMALIA OF CANADA EXCLUSIVE OF THE CETACEA.

BY J. B. TYRRELL, B.A., F.G.S.

The preparation of the present catalogue has been undertaken with the view of putting before the naturalists of Canada a short synopsis of the results of what has been done in recording the occurrence of the Mammalia in the Dominion up to the present time, and of stirring them up to renewed endeavours to fill in the many gaps which there evidently are in the list as it now stands, especially among the smaller Rodents and Insectivores.

Its synoptical character precludes the necessity of inserting a complete list of synonyms under each species, and those only have been mentioned which can be most readily referred to, or if unknown would be most likely to lead to confusion. The Cree and Saulteaux (Ojibway) names of the different animals have, whenever known, been given, as they will very often facilitate the obtaining of much valuable information from those tribes of Indians. These names have in all cases been obtained by the writer from the Indians themselves, or from half-breeds living with them, and in writing them the vowels have been given the continental sounds.

The catalogue has necessarily been to a large extent compiled, but during the past five years, while travelling in Manitoba and the North-West Territories, I have had the opportunity of making many observations on the distribution of the Mammalia, and the results of these observations have been incorporated throughout. Free use has also been made of the specimens collected for the Geological and Natural History Museum at Ottawa, and several of the officers of the Geological and Natural History Survey have furnished me with valuable notes; while for the notes on the Seals I am largely indebted to Mr. J. W. Tyrrell, who spent the winter of 1885-86 on Hudson's Straits, in charge of one of the Government Meteorological Stations.

The following are the principal books and papers relating to the Mammals of Canada, but there are many others that contain brief notices of one or more species:

Richardson, John. Fauna Boreali-Americana. London, 1829.

Audubon and Bachman. Quadrupeds of North America, 3 vols. New York, 1856.

Baird, Spencer F. Mammals. Washington, 1857.

Ross, Bernard H. List of the Mammals, etc., observed in the Mackenzie River District. Nat. Hist. Review, 1862, pp. 271-276.

Allen, H. Monograph of the Bats of North America, Smithsonian Institute, Washington, 1864.

Lord, John Keast. The Naturalist in British Columbia. London, 1866.

Gilpin, J. Bernard. On the Mammalia of Nova Scotia. Trans. Nov. Sc. Inst. Nat. Sci., vol. 3, 1871.

Coues and Allen. Monographs of North American Rodentia. Washington, 1877.

Coues, Dr. Elliott. Precursory Notes on American Insectivorous Mammals. Bull. U. S. Geol. Survey, 1877.

Coues, Dr. Elliott. Fur-bearing Animals. Washington, 1877.

Allen, Joel Asaph. North American Pinnipeds. Washington, 1880.

Chamberlain, M. List of Mammals of New Brunswick. Bull. Nat. Hist. Soc. N. B., 1884.

Thompson, E. T. A List of the Mammals of Manitoba. Trans. Man. Sci. & Hist. Soc. 188(6)7.

Saint-Cyr, D. N. The Pinniped Mammalia of the River and Gulf of St. Lawrence. Quebec, 1887.

Various articles by officers of the survey in the Reports of the Geological and Natural History Survey of Canada.

UNGULATA.

ALCE AMERICANUS, *Jardine.*

Moose.

Cervus Alces, Rich.

Mooswa. Western Cree.

Mooz. Saulteaux.

Common in the forest regions from Nova Scotia and New Brunswick westward to the Rocky Mountains, and north-westward to the mouth of the Mackenzie river and Alaska. Rare on the west side of the Rocky Mountains in Southern British Columbia, but reported as far west as the Gold Range.

RANGIFER CARIBOU, *Linn.*

Woodland Caribou.

Cervus tarandus sylvestris, Rich.

Muskeek-a-tik. Western Cree.

A-tikh. Northern Manitoba Cree.

A-tikh. Saulteaux.

Formerly abundant in Nova Scotia, but now almost extinct. Common in the more thickly wooded parts of northern New Brunswick, Quebec and Ontario, the North-West Territories and British Columbia, but very rare in north-western Manitoba.

RANGIFER GROENLANDICUS, *Linn.*

Barren Ground Caribou.

Cervus tarandus, var. *arctica*, Rich.

All the northern parts of the continent with the adjacent islands in the Arctic Ocean.

CERVUS CANADENSIS, *Erxl.*

American Elk. "Red Deer." Wáskasew.

Cervus strongyloceras, Rich.

Wa-was-ka-sio. Cree.

Mus-koos. Saulteaux.

Up to a hundred years ago an inhabitant of Eastern Canada, but now only occasionally met with from Manitoba westward to the Pacific coast, as far north as Lat. 57°, and also on Vancouver and some of the adjacent islands. Being easily approached it is becoming rapidly exterminated.

The name "Wapiti" was applied to this species by Richardson, who was apparently under the erroneous impression that the Indians knew it by this name. The Indian name "Wapatik" belongs, however, to the Mountain Goat and not to the Waskasew. The former means "white deer" (both the mountain sheep and mountain goat being considered as deer) and it would therefore only apply to the white Mountain Goat.

CARIACUS VIRGINIANUS, Bodd.
Virginia Deer.
Wap-ai-oos. Western Cree.
Wép-ai-oos. N. Man. Cree.

South-western New Brunswick, central Quebec and Ontario; and as var. *leucurus* Dougl. from the Plains of the Saskatchewan westward to the Pacific coast and Vancouver Island.

CARIACUS MACROTIS, *Say.*
Mule Deer. Black-tailed Deer.
Kas-ki-ché-wai-oos (the Black-tail). N. Man. Cree.
Kwas-kwé-pai-hoos (the Jumper). N. Man. Cree.
Mu-ke–ché-wai-oos, (the Black-tail). Saulteaux.
A-pi-si mo-soos, (the little Moose) Cree. Applied both to this and to the preceding species.

Plains of the Saskatchewan and westward as far as the Cascade range in British Columbia.

CARIACUS COLUMBIANUS, *Rich.*
Black-tailed Deer.
Cervus macrotis, var. *Columbianus*, Rich.

Westward from the Rocky Mountains to the islands off the coast of British Columbia.

ANTILOCAPRA AMERICANA, *Ord.*

Antelope. Cabree.

Antilope furcifer, (Smith) Rich.

A-pis-ché-chi-koo. Cree and Saulteaux.

Plains south of the North Saskatchewan eastward to the Missouri Coteau, and occasionally to the banks of the Assiniboine in the vicinity of Fort Ellice. Among the Cavicornia this animal is peculiar and resembles the deer in annually shedding the outer corneous portion of its horns.

APLOCERUS MONTANUS, *Ord.*

Rocky Mountain Goat.

Capra Americana, Rich.

Wap-a-tik (white deer). Cree.

From the Rocky Mountains westward to the Cascade Range and as far northward as the Arctic Circle.

OVIS MONTANA, *Cuv.*

Mountain Sheep. Big-horn.

Mai-a-tik. Cree.

Rocky Mountains to the Coast Range in British Columbia and as far north as the Arctic Circle.

OVIBOS MOSCHATUS, *Zimm.*

Musk Ox.

Barren grounds west of Hudson's Bay, to near the eastern boundary of Alaska. Not found further south than Lat. 59°.

BOS AMERICANUS, *Gmel.*

Buffalo. Bison.

Moos-toos. Cree.

Formerly living on the plains from the Red River to the foot or occasionally in the Passes to the west of the summit of the Rocky Mountains, chiefly found south of the forest line but some used to stray as far north along the Mackenzie River as Lat. 64°.

Now practically extinct in Canada though a small herd was seen by the writer near the Red Deer River in 1884. A few are still in existence in the basin of the Mackenzie River, and these which never migrate to the south, have come to be known as Wood Buffalo. With regard to these, Mr. King, the Hudson's Bay officer who is now in charge of Fort Pelly, but who till very lately has lived in the Peace and Mackenzie Rivers District, kindly furnished me with the following notes, stating at the same time that he had seen many of them. The animals will average two hundred pounds heavier than their prairie cousins and their hair is darker and thicker. When the Wood Buffalo were abundant in the Peace River country, the Prairie Buffalo were also very abundant. They lived in the open poplar woods outside the limits of the true forest, a style of country that is especially common throughout the North-West Territory. At present there are two bands known to be in existence. One band of about five hundred lives on what is locally known as the "Salt Plain" which is a prairie from five to twenty miles wide, stretching for five hundred miles south-westward from the vicinity of Fort Smith on the Slave River to the foot of the Rocky Mountains. Another band of about a hundred is roaming on a smaller prairie lying to the south-east of Fort McMurray between the Athabasca and Clearwater Rivers. Mr. King states that the two forms are very easily distinguished. Mr. Campbell, however, the Hudson's Bay officer who first established forts on the Yukon River, informed me that it was often impossible to distinguish what was known as the Wood Buffalo from the Prairie Buffalo.

CARNIVORA.

Felis concolor, *Linn.*

Cougar. Panther. Puma. Mountain Lion.

Mista-pi-sioo (big cat). Cree.

Found in rough wooded regions in southern Quebec, the Rocky Mountains, British Columbia, and Vancouver Island.

LYNX RUFUS, *Gmel.*

Wild Cat.

Common in Nova Scotia, New Brunswick, southern Quebec and Ontario. On the western side of the Rocky Mountains it is represented by the variety *fasciatus*.

LYNX CANADENSIS, *Geoff.*

Canada Lynx.
Felis Canadensis, Rich.
Pi-sioo. Cree.
Pi-si. Saulteaux.

In wooded country from the Atlantic to the Pacific, and in the summer migrating down the Mackenzie River to the Arctic Ocean.

CANIS LUPUS OCCIDENTALIS, *Rich.*

Wolf.
Mu-hi-kun. Cree.
Ma-ing-gun. Saulteaux.

Rare in Nova Scotia and New Brunswick, but still occasionally seen in the wooded parts of Quebec, Ontario, the North-West Territories and British Columbia.

Var. *griseus.* Grey Wolf.

Is the common form east of the Rocky Mountains.

Var. *albus.* White Wolf.

On the northern barren grounds, and on the islands in the Arctic Ocean and occasionally further south.

Var. *ater.* Black Wolf.

From the Mackenzie and Saskatchewan Rivers to the Pacific coast.

CANIS LATRANS, *Say.*

Coyoté.
Mista-chagonis (big belly). Cree and Saulteaux.

Plains and partly wooded country throughout Manitoba and the North-West Territories, though much more plentiful on the Upper Saskatchewan than elsewhere; also on the plains in the southern portion of British Columbia.

CANIS FAMILIARIS, *Say.*

Var. *borealis*, Desm.

Eskimo Dog.

Among the Eskimo on the north coast of America and on the islands of the Arctic Ocean.

Var. *lagopus*, Rich.

Hare Indian Dog.

Among the Hare Indians on the banks of the Mackenzie River.

VULPES VULGARIS, *Fleming.*

Var. *fulvus*. Red Fox.
Var. *decussatus*. Cross Fox.
Var. *argentatus*. Silver or Black Fox.
Mu-ki-sioo. Western Cree.
Ma-ka-sis. N. Man. Cree.
Wa-kush. Saulteaux.

All these varieties are more or less common in the wooded or partly wooded countries from the Atlantic to the Pacific.

VULPES MACROURUS, *Baird.*

Prairie Fox.

Plains of southern British Columbia and also on Vancouver Island.

VULPES VELOX, *Say.*

Kit Fox.

Canis cinereo-argentatus, Sabine.

Chi-kan-a-kow-esis, (louse eggs with hair). Cree and Saulteaux.

Wa-chi-koo-mi-sis, (a lousy thing). Cree and Saulteaux.

On the plains and prairies from Manitoba westward to the Rocky Mountains.

VULPES LAGOPUS, *Linn.*

Arctic Fox. White Fox.

and Var. *fuliginosus*.

Blue Fox.

Barren grounds and northern shores of the Continent as far south into Hudson's Bay as Fort Churchill, and very far north on the islands in the Arctic Ocean. Mr. J. W. Tyrrell informs me that the blue variety breeds true to its own color, and remains of essentially the same color throughout the year. One that he trapped in January, 1886, on the north shore of Hudson's Strait, and which is now in the Geological and Natural History Museum in Ottawa, is of a beautiful dark blueish gray color.

GULO LUSCUS, (*Linn.*) *Sabine.*
Wolverene. Carcajou. Glutton.

Formerly found in New Brunswick, and now occasionally met with in the northern parts of Quebec and Ontario. Found principally in the wooded parts of the North-West Territories to the northern limit of trees, and in British Columbia south to the boundary line.

MUSTELA PENNANTI, *Erxl.*
Pekan. Fisher.
Mustela Canadensis, Linn.
and Var. *alba*, Rich.
O-cheek. Cree and Saulteaux.

Nova Scotia, New Brunswick, and westward in wooded country to the Pacific, being found as far north as Great Slave Lake.

MUSTELA AMERICANA, *Turton.*
Marten. Pine-Marten.
Mustela martes, Rich.
Wa-pis-tan. Western Cree,
Wap-se-sioo. N. Man. Cree.
Wa-pi-sis. Saulteaux.

From the Atlantic to the Pacific as far north as the northern limit of trees.

PUTORIUS VULGARIS, *Linn.*
Weasel.
Putorius pusillus, Aud. and Bach.
Si-koos. N. Man. Cree.
Sin-goosh. Saulteaux.

From the Atlantic to the Pacific, at least as far north as Great Slave Lake.

Putorius erminеus, *Linn.*

Ermine.

Everywhere in Canada from the Atlantic to the Pacific.

Putorius longicauda, *Bonap.*

Long-tailed Weasel.

From the Plains of the Saskatchewan westward to the Pacific.

Putorius vison, *Brisson.*

Mink.
Putorius lutreolus, (Cuv.) Allen.
Putorius nigrescens, Aud. and Bach.
At-jak-as and *Shan-gwash.* Cree.
Shan-gwa-si. Saulteaux.

Throughout the whole of Canada from the Atlantic to the Pacific.

Mephitis mephitica, *Shaw.*

Skunk.
Mephitis Americana, var. *Hudsonica*, Rich.
Mephitis occidentalis, Baird.
Si-kak. Cree and Saulteaux.

Abundant in wooded and partly wooded country from the Atlantic to the Pacific, as far north as Great Slave Lake.

Mephitis putorius, *Linn.*

Little Striped Skunk.

J. K. Lord records it from southern British Columbia.

Taxidea Americana, *Schreb.*

Badger.
Meles Labradoria, (Sabine) Rich.
Mis-tan-isk. Cree.
Mis-tan-ak. Saulteaux.

On the plains and prairies from the Red River westward to the Rocky Mountains, as far north as the Saskatchewan and probably as far as Peace River. Also on the plains in southern British Columbia. Rapidly becoming extinct.

LUTRA CANADENSIS, *Turton.*

Otter.

Lutra Californica, Baird.

Lutra destructor, Barnston.

Ni-kik. Cree and Saulteaux.

From Nova Scotia and New Brunswick across the conttnent to Vancouver Island, and northward to the Arctic circle, or into the Barren Grounds.

ENHYDRA MARINA, *Steller.*

Sea Otter.

Enhydris lutris, (Linn.) Coues.

Western coast of British Columbia.

PROCYON LOTOR, (Linn.) *Storr.*

Raccoon.

E-sc-pun. Cree and Saulteaux.

Nova Scotia, New Brunswick and westward to the west side of Lake Manitoba.

Var. *Hernandezii.*

Vancouver Island and southern British Columbia.

URSUS HORRIBILIS, *Ord.*

Grizzly Bear.

Ursus ferox, Rich.

Mist-a-ya. Cree.

Formerly when buffalo were plentiful, an inhabitant of the plains along the Saskatchewan, but now confined to the mountains through which they roam northward as far as the Yukon.

URSUS ARCTOS, Rich.

Barren-Ground Bear.

On the Barren Grounds in the northern parts of Canada.

URSUS AMERICANUS, *Pallas.*

Black Bear. Brown Bear.

Mus-kwa. Cree.

Ma-kwa. Saulteaux.

Common throughout Canada from the Atlantic to the Pacific, as far north as the northern limit of trees.

THALASSARCTOS MARITIMUS, *Linn.*

Polar Bear. White Bear.

Along the shores and on the islands of the Arctic Ocean, sometimes straying about a hundred miles inland.

PINNIPEDIA.

ODOBAENUS ROSMARUS, *Malmgren.*

Walrus.

In comparatively recent times it inhabited the shores of Nova Scotia. Now it is confined to the shores of Labrador, Hudson's Strait and Bay and Davis Strait, as far north as explorers have reached. It appears to be very rarely met with between Melville Peninsula and Point Barrow.

EUMATOPIUS STELLERI, *Lesson.*

Sea Lion.

Shores of the North Pacific from Behring's Strait southward to California.

CALLORHINUS URSINUS, (*Linn.*) *Gray.*

Northern Fur Seal. Sea Bear.

West coast of British Columbia from Alaska to the International Boundary.

PHOCA VITULINA, *Linn.*

Harbor Seal. Fresh-water Seal.

Ka-si-gia. Eskimo.

This species inhabits both the Atlantic and Pacific coasts of Canada and ascends many of the larger rivers. It has been known to ascend the St. Lawrence to Lake Ontario, and the Ottawa River to the foot of the Chaudiere Falls at Ottawa. Found in Hudson's Strait, though not very abundantly at Ashe's Inlet, but in considerable numbers around the middle Savage Islands.

"The pups have a soft black glossy coat when born, but they soon become spotted, and as they grow older their coat becomes faded and coarser.—J. W. T."

PHOCA (PUSA) FOETIDA, *Fabr.*

Ringed Seal.

Nit-chill. Eskimo.

From the coast of Labrador around the north shore of the continent to Alaska. In Hudson's Strait it is the commonest species and is the principal food of the natives.

"The young are covered with a white fur."

PHOCA (PAGOPHILUS) GROENLANDICA, *Fabr.*

Harp Seal.

It sometimes strays as far south as Nova Scotia, but is especially abundant off the shores of Newfoundland and along the coast of Labrador into Davis Strait. In Hudson's Strait it is common on the south shore, but on the north shore it is rarely met with.

ERIGNATHUS BARBATUS, *Fabr.*

Bearded Seal. Square-flipper.

Ug-joo. Eskimo.

This species accurs in the Gulf of St. Lawrence, on the coast of Labrador, and on the shores of the Arctic Ocean, extending far north among the islands. The young has a soft grey coat of a little darker shade than that of the old one.

HALICHÆRUS GRYPUS, *Fabr.*

Grey Seal.

A rare species confined to the North Atlantic, where it has been found as far south as Sable Island, Nova Scotia, whence it ranges northward along the coast of Greenland.

CYSTOPHORA CRISTATA, *Erxl.*

Hooded Seal. Jumping Seal.

Cow-a-galee? Eskimo.

Shores of the Gulf of St. Lawrence, coasts of Newfoundland and Labrador and far northward into the Arctic Seas.

RODENTIA.

NEOTOMA CINEREA, (*Ord*) *Baird.*

Bushy-tailed Wood Rat.

Neotoma Drummondii, Rich.

Western and North-western Canada, from the Rocky Mountains westward to the Pacific coast.

HESPEROMYS LEUCOPUS, *Raf.*

White-footed or Deer Mouse.

Cricetus myoides, Gapper.
Hesperomys myoides, Baird.
Hesperomys austerus, Baird.
Hesperomys Boylii, Baird.
Wa-pi-kan-o-chi (White Mud Thing). Saulteaux.

From Nova Scotia and New Brunswick to the Pacific coast and northward to the Arctic Ocean.

HESPEROMYS LEUCOPUS, var. *Sonoriensis*, *Leconte.*

Mus leucopus, Rich.

Hudson's Bay to the Pacific coast and as far north as the mouth of Mackenzie River.

HESPEROMYS MICHIGANENSIS, *Aud. and Bach.*

Michigan Mouse.

Recorded by Thompson from Manitoba.

HESPEROMYS LEUCOGASTER, *Maxim.*

Missouri Mole-mouse.

Found by Dr. E. Coues on the Red River, so that it will doubtless be found in Manitoba.

EVOTOMYS RUTILUS, *Pallas.*

Long-eared Mouse.

New Brunswick to the west coast as far north as Fort Good Hope on the Mackenzie River.

EVOTOMYS RUTILUS, var. *Gapperi*, *Vigors.*

Red-backed Mouse.

Has been found in Nova Scotia, Manitoba, and on the west coast of Hudson's Bay. General range south of that of true *rutilus.*

ARVICOLA RIPARIUS, *Ord.*

Meadow Mouse.

Arvicola Pennsylvanicus, (Ord) Rich.

Kwa-skwun-da-pi-kan-o-chi (Jumping Mouse). Saulteaux.

From Nova Scotia and New Brunswick to the Rocky Mountains and doubtless also to British Columbia.

ARVICOLA RIPARIUS, var. *borealis*, *Rich.*

Little Northern Meadow Mouse.

Arvicola borealis, Rich.

North-western America, especially in the Mackenzie River region.

ARVICOLA TOWNSENDI, *Bach.*

Townsend's Meadow Mouse.

Recorded from Puget Sound so that it doubtless also occurs in southern British Columbia.

ARVICOLA XANTHOGNATHUS, *Leach.*

Chestnut-cheeked Meadow Mouse.

In North-western Canada from the Hudson's Bay to the Pacific.

ARVICOLA XANTHOGNATHUS, var. *Richardsoni*, *DeKay.*

Large Northern Meadow Mouse.

Arvicola riparius, (*Ord*) Rich.

Range essentially the same as the preceding.

ARVICOLA OREGONI, *Bach.*

Oregon Meadow Mouse.

Southern British Columbia.

ARVICOLA NOVEBORACENSIS, (*Raf.*) Rich.

Sharp-nosed Meadow Mouse.

Arvicola Drummondii, Aud. and Bach.

On the eastern slope of the Rocky Mountains about the head of the Athabasca River.

MUS DECUMANUS, *Pallas.*

Grey or Norway Rat.

Throughout the more settled parts of the Dominion. In the North-West Territories, found sparingly along the lines of railway.

MUS RATTUS, *Linn.*

Black Rat.

Recorded from both the Atlantic and Pacific sea-boards, but it has never reached far into the interior.

MUS MUSCULUS, *Linn.*

House Mouse.

Common in all the more settled parts of the country, but in Manitoba and the North-West Territories not yet found away from the lines of railway.

SYNAPTOMYS COOPERI, *Baird.*

Found both in Minnesota and Alaska and so will doubtless be found in Manitoba and the North-West Territories.

MYODES OBENSIS, *Brants.*

Tawny Lemming.

Arvicola helvolus, Rich.

Arvicola trimucronatus, Rich.

Found around Great Bear Lake, and in the Rocky Mountains as far south as Lat. 56°.

CUNICULUS TORQUATUS, *Pallas.*

Hudson's Bay Lemming.

Arvicola (*Georychus*) *Hudsonius*, Rich.

Arvicola Groenlandica, (Traill) Rich.

From Labrador around the northern coast of the continent, and on the islands in the Arctic Ocean.

ZAPUS HUDSONIUS, (*Zimm.*) *Coues.*

Jumping Mouse.

Meriones Labradorius, Rich.

Kis-chi-kwa-skwun-da-pi-kan-o-chi. (Big Jumping Mouse). Saulteaux.

Nova Scotia and New Brunswick and westward along the Saskatchewan to British Columbia, reaching as far north as Fort Simpson on the Mackenzie River.

FIBER ZIBETHICUS, *Linn.*

Muskrat.

Fiber Osoyoosensis, Lord.

Wa-chask. Cree.

Wa-shaskh. Saulteaux.

Throughout the whole of Canada as far north as the Arctic Ocean.

LEPUS TIMIDUS, *Linn.*, var. *arcticus*, *Leach.*

Polar Hare.

Lepus glacialis, (Leach) Rich.

Barren grounds in northern Canada as well as on the shores of the Arctic Ocean, reaching as far south into Hudson's Bay as Fort Churchill.

LEPUS CAMPESTRIS, *Bach.*

Prairie Hare. "Jack Rabbit."

Lepus Virginianus, (Harlan) Rich.

Mist-a-pus, (big hare). Cree.

Plains from the western limit of Manitoba westward to the base of the Rocky Mountains as far north as the Saskatchewan River. Also on the plains in southern British Columbia.

LEPUS AMERICANUS, *Erxl.*

Varying Hare. Rabbit.
Wapus. Cree.
Wapoos. Saulteaux.

Found throughout the northern part of the Continent as far north as the northern limit of trees.

LEPUS SYLVATICUS, *Bach.*

Wood Hare. Grey Rabbit.

Becoming quite common throughout Ontario.

Var. *Nuttalli* (*Lepus Artemisia*) is inserted by Lord in his list of Mammals from southern British Columbia, but from a previous remark in the text one would be led to infer that he obtained his specimens from a locality some distance south of the International Boundary Line.

LEPUS CALIFORNICUS, *Gray.*

Californian Hare.

Mentioned in J. K. Lord's List of Mammals from British Columbia.

ERETHIZON DORSATUS, *Linn.*

Canada Porcupine.
Hystrix pilosus, (Catesby) Rich.
Kakwa. Cree.
Kak. Saulteaux.

New Brunswick and Nova Scotia north-westward to Hudson's Bay, along its western shore to Fort Churchill and westward to the Mackenzie River.

Var. *epixanthus*, Brandt.

Yellow-haired Porcupine.

On the Pacific slope, and in the Rocky Mountains northward to the Liard River.

LAGOMYS PRINCEPS, *Rich.*

Little-chief Hare. North American Pika.
Lagomys minimus, Lord.

From the eastern slope of the Rocky Mountains westward along the International Boundary Line as far as Chilŭkweyuk Lake, and northward to Lat. 60°. Lord found his *L. minimus* near the banks of the Similkameen River, on the eastern side of the Cascade range, but at an altitude of 7,000 feet.

CASTOR FIBER, *Linn.*

Beaver.

Castor fiber Americanus, Rich.
Castor Canadensis, Kuhl.
Amisk. Cree.
Amikh. Saulteaux.

Throughout the whole of Canada to the northern limit of trees.

PEROGNATHUS MONTICOLA, *Baird.*

Mountain Pocket Mouse.

Recorded by J. K. Lord from southern British Columbia.

APLODONTIA LEPORINA, *Rich.*

Sewellel. Showt'l. Ou-ka-la.

Haplodon rufus, Coues.

Eastern and western slopes of the Cascade Range in British Columbia.

GEOMYS BURSARIUS, (*Shaw*) *Rich.*

Pouched Gopher.

Originally described from a specimen brought from eastern Canada.

THOMOMYS TALPOIDES, *Rich.*

Northern Pocket Gopher.

Po-ta-chi-ka-sioo. N. Man. Cree.
Po-ta-chi-pin-gwa-si, (The thing that blows up the loose earth). Saulteaux.

Very numerous in rich alluvial meadows from Manitoba westward along the Saskatchewan to the base of the mountains.

The surface is in many places undermined by this species to such an extent that a horse will repeatedly break through, thus making travelling both very tedious and unpleasant.

THOMOMYS TALPOIDES, var. *bulbivorus*, *Rich.*
Pacific Pocket Gopher.
Diplostoma ? bulbivorum. Rich.
Geomys Douglassii, Rich.

Southern portion of British Columbia.

SCIUROPTERUS VOLUCELLA, *Pallas.*
Var. *Hudsonius*, Gmel.
Northern Flying Squirrel.
Pteromys sabrinus, Rich.
Pteromys sabrinus, var. *B. alpinus*, Rich.
Pteromys Oregonensis, Bach.
Sa-ka-skan-da-wa-si, (a thing that sticks close to anything). Saulteaux.

From the Atlantic to the Pacific as far north as Hudson's Bay, Great Slave Lake and Fort Liard.

SCIURUS HUDSONIUS, *Pallas.*
Red Squirrel. Chickaree.
A-ni-wa-chask. Cree.
A-chit-a-moo. Saulteaux.

From the Atlantic westward to the Rocky Mountains and northward to the northern limit of trees.

Var. *Richardsoni*, Bach.

Rocky Mountains to the Cascade Range in the vicinity of the International Boundary Line.

Var. *Douglassi*, Gray.
Sciurus Hudsonius, var. β, Rich.

Coast of British Columbia.

SCIURUS CAROLINENSIS, *Gmel.*

Grey Squirrel. Black Squirrel.
Sciurus niger, Rich.
Sciurus leucotis, Gapper.
Sciurus migratorius, Aud. and Bach.

From western New Brunswick, through southern Quebec and Ontario as far west as the north shores of Lakes Huron and Superior. Especially abundant, however, in the wooded parts of the Western Peninsula of Ontario.

SCIURUS FOSSOR, *Peale.*

California Grey Squirrel.

Given in Lord's list of Mammals from southern British Columbia.

TAMIAS STRIATUS, *Linn.*

Striped Squirrel. Chipmunk.
Sciurus (*Tamias*) *Lysteri*, (Ray) Rich.

Common from the Atlantic coast westward to eastern Manitoba. Not found west of Lake Manitoba.

TAMIAS ASIATICUS, *Gmel.*

Var. *borealis*, Coues.

Northern Chipmunk.
Sciurus (*Tamias*) *quadrivittatus*, Rich.
A-kwin-gwis. Saulteaux.

Ranges from the western side of Hudson's Bay, on the Churchill and Nelson Rivers to the north shore of Lake Superior, westward to the Rocky Mountains and northward on the Mackenzie River to the Arctic Circle.

Var. *quadrivittatus*, Say.

Rocky Mountains, and mountains in British Columbia in the vicinity of the International Boundary Line.

Var. *Townsendi*, Bach.

Coast of British Columbia.

TAMIAS LATERALIS, *Say*.

Say's Chipmunk.

Arctomys (*Spermophilus*) *lateralis*, Rich.

Rocky Mountains from the International Boundary north to Lat. 57°.

SPERMOPHILUS EMPETRA, *Pallas*.

Parry's Spermophile.

Arctomys (*Spermophilus*) *Parryi*, Rich.

Arctomys Kennicotti, Ross.

Barren grounds from the east side of Hudson's Bay to Alaska, as far north as the Arctic circle.

Var. *erythroglutæus*, Rich.

Rocky Mountains from the Boundary Line north to Lat. 57°.

SPERMOPHILUS RICHARDSONI, (*Sabine*) *Rich*.

Richardson's Spermophile. Grey Gopher.

A-pis-chin-a-kwa-cha-shuk, (a little squirrel). Saulteaux

From the Pembina Escarpment in Manitoba to the base of the Rocky Mountains, and northward to the Saskatchewan.

Var. *Townsendi*, Bach.

Arctomys (*Spermophilus*) *guttatus*, Rich.

Southern portion of British Columbia.

SPERMOPHILUS FRANKLINI, *Sabine*.

Grey-headed Spermophile.

A-pis-chan-as-koos, (a little badger). Cree.

Mist-a-chit-a-moo, (a big squirrel). Saulteaux.

Western Manitoba northward to the Saskatchewan River, but none were seen as far west as Fort Pitt.

SPERMOPHILUS TRIDECEMLINEATUS, *Mitchill*.

Striped Gopher.

Arctomys (*Spermophilus*) *Hoodi*, Rich.

Sa-sa-wa-pas-koos. Cree.

Ta-chi-kow-kan-a-see (striped back). Saulteaux.

From Red River westward to the base of the Rocky Mountains, as far north as the North Saskatchewan.

ARCTOMYS MONAX, *Linn.*

Woodchuck. Ground-hog.

Arctomys empetra, (Sabine) Rich.

Arctomys pruinosus, Gmelin.

A-kwa-kwa-chis. Saulteaux.

Nova Scotia and New Brunswick and westward around the shores of Hudson's Bay to the Mackenzie and Liard Rivers, as far north as Lat. 62°.

ARCTOMYS CALIGATUS, *Eschscholtz.*

Hoary Marmot.

Arctomys pruinosus, (Gmel.) Rich.

Arctomys Okanaganus, King.

Rocky Mountains westward to the Cascade Range and northward to the Arctic Circle. Often seen among heaps of angular masses of loose rock. I can find no reference to its being found east of the Rocky Mountains.

The specific name *caligatus* has here been used instead of *pruinosus*, which latter name, as was pointed out to me by Prof. Macoun, appears to have been in all probability first applied to a light-colored specimen of *monax*. Pennant's description on which Gmelin's name *pruinosus* was founded, as given in Coues and Allen's "Monographs of North American Rodentia" p. 926, agrees so well with a specimen of *A. monax* from Hudson's Bay, the original locality, now in the Geological and Natural History Museum, that I have very little hesitation in placing Gmelin's species as a synonym of *A. monax*; and although the *A. pruinosus* of Richardson is undoubtedly the true *A. caligatus*, his name cannot stand on account of its having been formerly applied to a different species.

INSECTIVORA.

SCALOPS AQUATICUS, *Linn.*

Common Mole.

Common throughout Eastern Canada.

Scapanus Townsendi, *Bach.*

Oregon Mole.

Scalops Canadensis, Rich.

Scalops latimanus, Bach.

Scalops æneus, Cassin.

Southern portions of British Columbia.

Scapanus Breweri, *Bach.*

Hairy-tailed Mole.

New Brunswick.

Condylura cristata, *Linn.*

Star-nosed Mole.

Condylura longicauda, (Ill.) Rich.

Condylura macroura, Rich.

From the Atlantic Coast north westward to Hudson's Bay and westward to the Rocky Mountains.

Urotrichus Gibbsi, *Baird.*

Chilukweyuk River in southern British Columbia.

Neosorex palustris, *Rich.*

Marsh Shrew.

Nova Scotia to the Rocky Mountains around the borders of lakes.

Sorex Trowbridgii, *Baird.*

Southern British Columbia.

Sorex Forsteri, *Rich.*

Forster's Shrew.

From Nova Scotia to the Rocky Mountains, and as far north on the Mackenzie River as the Arctic Circle.

Sorex Thompsoni, *Baird.*

Thompson's Shrew.

Halifax, Nova Scotia.

Sorex vagrans, (Cooper) *Baird.*

Southern British Columbia.

SOREX SUCKLEYI, *Baird.*
Southern British Columbia.

SOREX PACHYURUS, *Baird.*

Found at Pembina, Minn., so it doubtless will be found in Manitoba.

SOREX PLATYRHINUS, *DeKay.*
Nova Scotia and New Brunswick.

SOREX PERSONATUS, *Geoff.*
Cooper's Shrew.
Ki-ni-ki-si-wa-pi-kan-o-chi, (Sharp-nosed mouse).
Saulteaux.
New Brunswick to the eastern slope of the Rocky Mountains

SOREX BELLI, *Dobson.*
Near York Factory, Hudson's Bay.

SOREX SPHAGNICOLA, *Coues.*
Fort Liard in the north-eastern corner of British Columbia.

BLARINA TALPOIDES, *Gapper.*
Nova Scotia to Western Ontario.

BLARINA BREVICAUDA, *Say.*
Nova Scotia and New Bruswick, westward to Eastern Manitoba.

BLARINA AUGUSTICEPS *Baird.*
Nova Scotia.

BLARINA CINEREA, *Bach.*
Nova Scotia.

CHEIROPTERA.

ATALAPHA NOVEBORACENSIS, *Tomes.*

Red Bat.

A-pu-kwan-a-chis. Cree. *A-pu-kwan-a-chi.* (A covering). Saulteaux. Used generally for all species of bats.

Throughout Canada from the Atlantic to the Pacific.

ATALAPHA CINEREA, *Beauv.*

Hoary Bat.

Vespertilio pruinosus, Rich.

Nova Scotia to Manitoba.

SCOTOPHILUS FUSCUS, *Beauv.*

Brown Bat.

Has been found in Ottawa city and also near Lake Winnipeg.

SCOTOPHILUS NOCTIVAGANS, *Leconte.*

Silvery-haired Bat.

From the Atlantic to the Rocky Mountains and northward to Hudson Bay.

VESPERTILIO SUBULATUS, *Say.*

Little Brown Bat.

Common throughout Canada east of the Rocky Mountains.

VESPERTILIO LUCIFUGUS, *Leconte.*

Blunt-nosed Bat.

From the Atlantic to the Pacific and northward as far as Hudson's Bay.

OTTAWA, February 23rd, 1888.

THE DEVELOPMENT OF LANGUAGE

BY HORATIO HALE.

IT is the characteristic of modern science that it seeks to account for all development and progress by the operation of existing causes. In an address delivered before the Section of Anthropology in the American Association for the Advancement of Science, at the meeting of 1866, I sought to show in what manner this general law is applied to elucidate the history of language. The origin of linguistic stocks or families has been deemed one of the most mysterious problems in philological science. There are, so far as our present knowledge extends, between two and three hundred of such stocks, differing totally from one another both in vocabulary and in grammar. Various hypotheses have been offered to explain their origin, but none has been generally accepted as satisfactory. Professor Max Müller, in his "Science of Language," considers the problem extremely difficult, but not insoluble. He compares it to the question of the plurality of inhabited worlds, but deems it not quite as hopeless. He believes (and, as I hope to show, with justice) that it may receive a solution which will demonstrate that all languages have proceeded from one source. On the other hand, Professor Hovelacque, in his excellent work "La Linguistique," presents the fact of the existence of "a multiplicity of irreducible linguistic systems," as "a capital argument" in favor of that polygenist view, which holds that man, originally speechless, acquired the faculty of speech in as many different places as there are different linguistic stocks.

This view, it will be seen, though maintained by a distinguished evolutionist, is in itself anti-evolutionary; for it assigns the origin of linguistic stocks to a cause no longer in operation. In the address referred to, I endeavored to show that the origin of these stocks was due to a force which is in constant activity, and which I described as "the language-making instinct of very young children." Every parent must have noticed how his child, when beginning to talk, constantly uses novel expressions, apparently of its own invention, but doubtless often mere corruptions of words, perhaps misunderstood, uttered by its elders. Ordinarily these peculiar expressions are soon corrected and forgotten. But instances not unfrequently occur where two children of the same age or nearly the same age, who are left much together, proceed in their invention of these novel terms until they frame a complete language, sufficient for all purposes of their childish intercourse, but totally unintelligible to those about them. Several instances of the creation of such child-languages were cited, and the fact was pointed out that in the first peopling of every country, when, from various causes, families must often be scattered at very wide distances from one another, many cases must have occurred where two or more young children, left by the death of their parents to grow up secluded from all other society, were thus compelled to frame a language of their own, which would become the mother tongue of a new linguistic stock.

As the address has been published (in the volume of the Association for 1886) it will not be necessary to repeat the facts and reasoning which were offered in support of this theory. Though presented under serious disadvantages—for the restricted limits of a public address compelled the omission of much evidence which had been gathered in its support—the reception thus far accorded to it, by authorities of the highest rank, seems to afford a good augury of its ultimate general acceptance. The few objections which have been made to it are only such, I am confident, as a fuller discussion and a better understanding of its character and purport will remove. Most of them had in fact been already anticipated and answered in the original essay, of which the address in question was a brief and partial summary. I am grateful, therefore, to the Philological Committee of the Institute for the opportunity which their invitation affords me of laying before students of linguistic science some of the omitted portions of my essay, which may aid in commending to their judgment the views thus suggested on the origin of linguistic stocks, and on the natural laws which govern the development of speech.

Two widely different theories in regard to the formation and growth of language have been maintained by eminent philologists who have written on that much-vexed question. One class, at the head of whom may be placed the great name of Jacob Grimm, have argued that this formation must have been a gradual process, commencing with a few hundred monosyllabic roots, from which, by slow and progressive steps, continued from generation to generation, have sprung, first, the agglutinate type, and, finally, the inflective form of speech. On this theory, the Chinese represents the primitive cast of language, the Manchu or Malay would indicate the secondary or intermediate form, and the Semitic and Aryan would display the latest and highest development. The linguistic process, however, does not rest here. According to the theory, as set forth by its most distinguished advocate,* when language has reached its highest stage of synthesis, such as appears in the Sanscrit, the Greek, and the Latin, a disintegrating or analytic force makes itself felt. The too elaborate and cumbrous grammatical system is gradually decomposed ; many inflections disappear, and the analytic tongues of modern India, Persia and Europe are formed.

These views are strongly combated by another class of scholars, among whom a high place is due to the eminent author of the "General History of the Semitic Languages." To cite the forcible argument of M. Renan in his own words :—"Grimm recognizes, with all linguists, the fact that the farther we go back in the history of languages, the more synthetic, rich, and complicated we find them ; but he refuses to follow the induction to the end. Instead of concluding from this progression that the primitive language, if we could know it, would be a model of exuberance, he stops short, and supposes before the synthetic period a period of infancy, the reality of which there is no positive fact to prove. I do not think that it is allowable thus to escape from the rule of analogies ; the human mind has no such sudden turns ; its laws operate in a continuous manner. The advance of languages towards analysis corresponds to the advance of the human mind towards a reflection more and more clear. This common tendency of the human mind has existed from the first day ; and it is, therefore, in the first day that we must place the highest degree of synthesis."* "That which," he continues, "so often induces linguists to regard the elementary monosyllabism of the Chinese as the primitive condition of all languages is the inclination which leads us to look upon simplicity as the mark of a state of infancy, or, at least, as the character of a high antiquity. But this is an error, from which philology should guard itself. The Chinese speech, wholly monosyllabic as it is, has served as the organ of a highly developed civilization. On the other hand, the languages of the barbarous tribes of America and of the people of Central and Southern Africa, which begin to furnish unexpected revelations to science, offer a truly surprising wealth of grammatical forms. According to Grimm's hypothesis, we must suppose in these populations a powerful effort, which at a certain epoch has caused them to issue from the infantile stage, and to pass into that of reflection. The grammatical system of the Hottentots being much more advanced than that of the Chinese, we should have to admit that the Hottentots have made greater progress than the Chinese in the path of intellectual development, and are farther removed from their primitive condition. This is a conclusion which it would be impossible to maintain."†

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* J. Grimm : "Uber den Ursprung der Sprache ;" Berlin, 1852. His views are summarized and discussed in the Preface to Renan's work, "De l Origine du Language," 5th edit. Paris, 1875.

M. Renan's argument appears to be decisive against the theory of the great German philologist; but, strange to say, he does not observe that it is equally decisive against his own. If there is no fact which proves that the synthetic condition of the Sanscrit, the Greek and the Arabic has been preceded by a monosyllabic stage, there is equally no fact to show that the monosyllabic condition of the Chinese has been preceded by a polysyllabic or synthetic stage. Some writers have, indeed, suggested that such a stage once existed, and that the monosyllables which have been spoken for four thousand years in China are merely the relics of inflected dissyllables or longer words, which, by the combined influences ot analysis and of phonetic decay, have been reduced to their present formless condition. This suggestion, however, fails to take in view the fact that the Chinese is only one of a large family of monosyllabic tongues. Several such languages are spoken in the region south of China and east of the Ganges. The Khasi, the Tai of Siam, and the Anamese are as purely monosyllabic as the Chinese, and yet differ totally from it in vocables, and sometimes in that which constitutes the only grammar of this form of speech—the collocation of words. To maintain that all these languages, with their numerous dialects, spoken in many cases by barbarous or semi-barbarous populations, have been produced by the simplification of polysyllabic tongues, through a long course of development and reflection, would be a bold assumption, for which there are no historic or scientific grounds whatever.

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* "De l'Origine du Langage," p. 11.

† *Ib.*, p. 14.

The necessary conclusion from all the facts within our knowledge is that the mother-tongues of the various linguistic stocks were of widely different types, some monosyllabic, others agglutinative, and others inflective in different forms. This conclusion, which at first sight seems not to accord with the opinions either of Grimm or of Renan, is not perhaps entirely at variance with the theories of either. The former held that language began with monosyllables, and grew by gradual development to the inflective state. The latter, to use his own words, "regards language as framed at a single stroke *(d'un seul coup,)* issuing instantaneously from the genius of each race."* It may appear, singularly enough, that the two views, seemingly so irreconcilable, are both to a certain extent justified by the facts. A new language arising in one generation would doubtless be deemed by M. Renan to have been "formed at one stroke." Yet this language might, in the process of its formation, have conformed to the theory of the German philologist, and have grown by gradual development from the monosyllabic to the inflected stage.

If every new mother-tongue began, as we suppose, in the lips of very young children, its first form would necessarily be in the main monosyllabic. No child in its first utterances willingly pronounces a dissyllable, unless it be a simple repetition, like *papa*, *mama*, *dada*. Some years ago the author took special notice of this fact in the early speech of a little boy of his household. He was a very intelligent child, with good vocal organs, and, as it subsequently appeared, with rather unusual aptitude for language. At the age of two years, he could say many words, but (except in a few cases of repetition, like those just referred to) they were all monosyllables, composed either of one vowel or diphthong alone, or else of a vowel or diphthong preceded by a single consonant. Every word ended with a vowel, and two consonants never came together. All his words were thus reduced to a form of the utmost simplicity; and, of course, the same syllable had many significations. *Co* signified clothes, coat, cold; *că* was cat, cap, candy, scratch; *f*, which he could not manage, became *w*, and thus "walk" and "fall" were both pronounced *waw*. *R*, which he could not pronounce, became *l*, and thus both "ride" and "like" were sounded *li*. His sister's pet-name, Florrie, became *Woy*, and Willie was sounded *Wee*. Yet, with this imperfect speech, the little fellow managed to make his meaning partly intelligible to his mother, and completely so to his brother, older than himself, who readily conversed with him, and became his interpreter to the older members of the family. Here, it will be seen, was already the commencement of a new language. What was particularly interesting was the fact that this language took a completely Chinese form. In the proper Chinese language, as is well-known, every word ends in a vowel, either pure or nasalized; and the great majority of words comprise but a single consonantal sound. Indeed, where in our orthography a Chinese word commences with two consonants, their utterance represents to the native ear a single sound,—this sound being a mute combined with an aspirate or a sibilant, as in *kho*, *tsa*. Occasionally both aspirate and sibilant follow the mute, still making with it, according to Chinese notions, a single consonant, as in *thso*, *thseng*. These combinations, however, are rare, the *k*, *p*, and *t* being the only consonants which can be followed by the aspirate or the sibilant, and the *t* alone being capable of receiving them both at once. The total number of syllables in the Chinese language—that is, of what we should consider words—is only 450, which is raised to 1203 by the variation of accents.*

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* "Je persiste donc, après dix ans de nouvelles études, à envisager le langage comme formé d'un seul coup, et comme sorti instantanément du génie de chaque race."—De l'Origine du Langage; preface to 5th edition, p. 16.

If we suppose that a new speech had to be framed by an isolated group of young children, in whom the linguistic faculty was naturally weak, and was exceptionally slow in development, we can understand how such a language might be arrested in its monosyllabic stage. Its four or five hundred words would be ample as a means of communication among children, and if these words were supplemented, as the speakers grew older, by the variations made by the tonic accents, giving thus 1200 distinct vocables, the language would be complete for all essential purposes. Few uncivilized communities have a greater number of primitive words in ordinary use. How the highly civilized and literary Chinese manage to express with their limited vocabulary a vast range of ideas is easily understood. Much is accomplished by the mere effect of position,—a method which is almost as fruitful in language as in arithmetic. Thus *tá* signifies great, or greatness; *jîn*, man or manly: *tá jîn* is "great man;" *jîn tá*, manly greatness. *Jîn* may become a verb, as in the expression quoted by Rémusat from the discourse of a Chinese author against the Buddhist monasteries, *jîn khî jîn*, literally "man those men," i.e., make men of those persons who are not now acting the part of men. So, in English, we can say a "man-child" and a "child-man." A merchant-captain will "ship a man" to "man his ship." What is with us an occasional practice is the regular habit of the Chinese language. To this should be added the use of conjoint expressions, in which each part explains the other. Thus *táo* has twelve meanings in Chinese, and makes, in fact, twelve words, totally distinct, and each represented by its own written character. Among these meanings are to lead, to rob, to cover, a flag, cereal grain, and *way*. *Loú* has seven significations, with as many characters, comprising dew, cormorant, to suborn, and *road*. When these two words are united in the form of *táo-loú*, to express a single idea, that idea can only be the one common to both, namely *way* or *road*.* The combined form is not properly a compound or a dissyllable, as each word retains its tonic accent; but the method, nevertheless, gives to the language the same means of avoiding ambiguity, and of enlarging its vocabulary, which are possessed by the synthetic tongues. From *choû*, book, and *fâng*, house, we have *choû-fâng*, book-house, i.e., library; from *khĭ*, begging, and *jîn*, man, *khĭ-jîn*, beggar; from *thiân*, heaven, and *niù*, daughter, *thiân-niù*, heaven's offspring, which, by a poetical metonymy, has become the ordinary name of the swallow.† In this way, the language, with its scanty list of primitive vocables, has been made sufficient for the needs of an elaborate culture and an extensive literature.

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* Abél-Rémusat: *Grammaire Chinoise*, p. 33.

The child who at two years of age could pronounce only the simplest monosyllables, and that very indistinctly, is able, when a year or two further advanced, to master words of two or three syllables, and to form sentences which are intelligible enough to all hearers. He has still, however, no comprehension of grammar, and dispenses not only with inflections, but usually with pronouns, articles, and the other auxiliary parts of speech. Instead of "Papa, will you tell me a story?" he says, "Papa, tell Harry story?" Instead of "the cat scratched me yesterday," he says, "cat scratch Harry yes'day." Instead of "I have just seen two pigeons flying overhead," he says, "Harry just now see two pigeon—pigeon fly high, high." Every parent will recognize this style of speech; and the philologist will see that, except in the absence of pronouns (and sometimes even in this respect,) it represents the simplest form of agglutinative speech, such as we find in the Malay and Manchu groups of languages. Our children, under the instruction of their elders, quickly pass beyond this stage; but we can readily understand how a group of young people, not endowed with a large measure of the language-making faculty, might, if left entirely to themselves, be satisfied to let their language remain in this stage.

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* Grammaire Chinoise, p. 108. The English "roadway" offers a curious resemblance to this expression.

† *Ib.*, p. 111. The pronunciation of the Chinese words is given in the French orthography.

If, however, in a family of children, such as we have supposed to be left to form a speech for themselves, the elders proved to be endowed with a good linguistic faculty, we may feel confident that, long before reaching maturity, they would begin to employ inflections, and that, if this faculty happened to be particularly strong, these inflections would, by the time the children were fully grown, have developed into a complete and elaborate grammatical system. The steps by which this stage would be reached are sufficiently evident. The most essential adverbs or adjectives of place and time, number and quality,—here, there, yonder—now, then, soon, yesterday, to-morrow—one, two, three, many, more—good, bad, much, little,—would first appear. From the adverbs of place would spring both the pronouns and the prepositions. If the language remained in the agglutinative stage, these auxiliary terms would continue isolated, or loosely attached to the principal words, the names of things or of actions. But a stronger language-forming faculty would not be satisfied to rest here. The qualifying particles would presently be incorporated with the nouns and verbs, to form cases, numbers, tenses and moods. The Aryan or the Euscarian speech would thus be developed. Or, perhaps, when the qualifying adverbs had come into use, some youth in whom the linguistic instinct was particularly strong, would hit upon a compendious mode of expressing the sense of these qualifying words, not by incorporating them with the verb or the noun, but by changing the vowel of the verb or the noun to correspond with that of the adverb. The difference in the two methods is easily understood, and we can readily see how either of them might occur to an intelligent boy or girl. If *bodha* signifies "to know," and *am* or *ami* is "I," and *an* is "then," the Aryan lad might affix the pronoun to the verb, and for "I know," would say succinctly, *bodhami*, know I. If he wishes to speak of a past time, he will prefix the adverb in an abridged form, and for ease of pronunciation will shorten the suffixed pronoun. Instead of saying *an bodhami*, "then know I," he will say, briefly, but intelligibly, *abodham*, and thus produce the Aryan imperfect with its well-known "augment." Another lad, the leader in a second isolated group, has been accustomed to use the word *daraba* for "strike" or "struck," in a vague and general sense, with no particular reference to time. He wishes on some occasion to say distinctly, "now striking." *Hu* is "now" or "here," and he might say, "*hu daraba*;" but a quick sense of euphony suggests to him the happy idea of changing the vowels of the verb to correspond with that of the adverb; he says, "*durubu*," or, in an abridged form (with the pronoun prefixed) *yadrubu*, "he is now striking;" and his companions, with equally ready apprehension, at once catch his meaning, and conform to his method of speaking. The germ of a new system of inflection is thus formed, and is quickly developed into a language of the Semitic type. This, however, it should be observed, is not the only mode in which languages of this type may have originated. As we shall see presently, there is evidence to show that the method of inflection by internal vocalic change may have been, in some cases, among the very earliest products of the language-making faculty.

The logical result to which we are brought by our course of reasoning is evident enough. *The inflections of a language must be coeval with the language itself, and must originate with its first speakers.* This, as has been seen, is the view of Renan. But no writer has expressed more clearly and forcibly than Professor Max Müller the important truth, that the mould of each linguistic stock bears evidence of having been formed at once for all time. "In the grammatical features of the Aryan and Semitic dialects," he observes, "we can discover the stamp of one powerful mind, once impressed on the floating materials of human speech, and never to be obliterated again in the course of centuries." "Most words and grammatical forms in these two families," he adds, "seem to have been thrown out but once by the creative powers of an individual mind; and the differences of the various Semitic and Aryan languages, whether ancient or modern, were produced not so much by losses and new creations, as by changes and corruptions which defaced in various ways the original design of those most primitive works of human art." He affirms that "no new root has been added, no new grammatical form been produced, in any of the Aryan provinces or dependencies, of which the elements were not present at the first foundation of this mighty empire of speech." Thus he regards the Semitic and Aryan languages as "the manifestations and works of two individuals, which it is impossible to derive from one another." *

The same proposition, of course, must apply to every linguistic family. The grammatical framework of each stock must have been struck out and put together once for all. It does not necessarily follow, however,—nor need we understand Professor Müller to assert,—that the framer of a new speech must, in all instances, have had a powerful mind or a strong linguistic faculty. On the contrary, it is evident enough that certain languages, such as the Chinese, the Thibetan, and the Malay, indicate but a weak development of this faculty. Nor does it seem literally correct to speak of one mind as engaged alone in the formation of a language. Speech implies at least two collocutors. It would be more exact to say that each linguistic stock must have originated in a single household. There was an Aryan family-pair, a Semitic family-pair, an Algonkin family-pair. And further, it is clear that the members of each family-pair began to speak together in childhood. No instance was ever known, nor can one be reasonably imagined, of two persons, previously speechless, beginning to speak together in a new language of their own invention, after they had attained maturity. On the other hand, many instances are known (as is shown in the address referred to) in which young children have devised and constantly used such a language.

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* In Bunsen's "Philosophy of Universal History," Vol. I, p. 475.

It is unquestionably true, as Max Müller has said, that after this primitive household had been dispersed, no new grammatical form was ever produced, of which the elements were not present in the original speech. Careful reflection will show that this is not merely the proper deduction from all the known premises, but that it is the only reasonable conclusion. Let any person suppose that a language of uninflected roots had arisen, and had existed for several generations, until the population speaking it had been somewhat widely diffused; and let him then endeavor to imagine how an attempt to introduce inflected forms—as for example, a future tense, a subjunctive mood, or a possessive case—would be received. If the people had been able to make themselves understood without these new-fangled contrivances, why should they take the trouble to adopt them? There can be no doubt that some of the Latin and German inflections would be very useful in English, and would be highly conducive to clearness and force; but how hopeless would be the attempt to introduce them! Unless we are willing to suppose that human nature in prehistoric times differed utterly from the human nature of to-day, we must believe that the same difficulty, or rather impossibility, would have been found in those days.

To this general statement, however, there are certain apparent exceptions, which should be noticed. As will be seen, they simply confirm the rule, in the shape in which Prof. Max Müller has laid it down. A change in the form of inflections not unfrequently takes place. The Anglo-Saxon tongue had many ways of forming the plural. It might terminate in *s*, in *u*, in *a*, or in *n*, or it might be indicated by a change in the radical vowel. *Wulfa*, wolf, became *wulfas; scipa*, ship, *scipu; handu*, hand, *handâ; tunge*, tongue, *tungan; bôk*, book, *bêk*. All these plurals have now in English but one termination, in *s*. We say wolves, ships, hands, tongues, books. In French and Spanish plurals, a similar change has taken place, from the variety of the Latin forms, to a single termination in *s*. The rule is, that when, from the habit of speech, the need of an inflection is strongly felt, and it happens that, for any reason, one form disappears, another, the simplest, and most convenient, is likely to be adopted, by a sort of common consent, in its place. A striking example is found in the future tense of the Romanic languages. In the confusion of speech which followed the conquest of Latin Europe by the Teutonic barbarians, the southern dialects remained radically Latin, but many inflections, as, for example, the cases of nouns, disappeared altogether. The Latin future was also lost; but the need of this tense was so strongly felt, that a new one was formed by uniting the auxiliary verb "have" with the principal verb. Thus the Spanish provincial, instead of *amabo, amabis, amabit*, learned to say *amar he, amar has, amar ha*, literally, I have to love, thou hast to love, he has to love; and these expressions were easily compressed into the modern forms *amaré, amarás, amará.* * It is well known that the Latin tense itself is (in the first and second conjugations) of a similar secondary formation, replacing an early Aryan future.

Thus in every instance, where any record exists, we are led back from these secondary formations to an earlier stage of the language; and the natural and indeed inevitable inference is that, in all languages of every stock, the same general law prevails. The various dialectical forms, either of words or of grammar, are in general mere corruptions or replacements of elements which existed in the original speech.

At this stage of our argument it becomes necessary to consider with some care an important question which has already been incidentally alluded to—that of the difference between synthetic and analytic languages. The fact that during the historic period the progress of language has in general been from the more to the less complex form is unquestionable. The process which strikes us in the rise of the Romanic languages on the ruin of the Latin is repeated in the Teutonic countries, in Greece, in Persia, in India, and in Arabia. In all these regions many inflected and composite forms have disappeared, and have given place to simpler and more analytic methods. Prepositions and auxiliary verbs have, to a greater or less extent, superseded the case-forms, tenses, and moods of the primitive tongues. This has been regarded as a progress from synthesis to analysis; and, as has been already shown, some eminent writers have been led to maintain that this progress represents the natural and necessary advance which a language makes, with the development of intellect and of culture in those who speak it. Some have even gone so far as to speak of highly complex and synthetic tongues as "barbarous languages," and the more analytic idioms as "civilized languages." A wider induction, however, appears to lead to a very different conclusion.

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* Marsh: "Lectures on the English Language: Lect. XV.

There is no doubt that, as a general thing, the less composite and more analytic of two allied languages is likely to be the more recent in its formation; or, to speak more precisely, if two languages stand to each other in the relation of mother and daughter, as the Anglo-Saxon to the English, the Latin to the Italian, the Greek to the Romaic, the Samoan to the Hawaiian, the daughter tongue is certain to be the simpler and less inflected of the two. But it is equally certain—and indeed these very examples are sufficient to show—that the change of form has nothing whatever to do with any intellectual or social advancement, and that to speak of it as a progress in any sense is wholly to misconceive its nature and origin. In fact it is more properly a degradation and an impoverishment. The modern languages of southern Europe assumed their present "analytic" form, as it is styled, during the middle ages, at a time when the communities speaking them were certainly, in every point of literary culture and social organization, very far below their predecessors who spoke the highly composite classic tongues. No one will maintain that the present inhabitants of northern Hindostan are intellectually superior to the contemporaries of Kalidasa, or that the modern Persians, who speak one of the most analytic of Aryan languages, are superior in intelligence to their ancestors of the Zoroastrian era, the speakers of the highly inflected Zend.

The causes to which all these modern languages owe their poverty in inflected forms are so well known, historically, that the disposition to ascribe it to intellectual progress is somewhat surprising. Primitive mother-tongues, as has been seen, vary in character, from the bare simplicity of the monosyllabic Chinese and Anamese to the extreme complexity of the Sanscrit and the Algonkin. When the community which speaks one of these original tongues remains in its pristine seat, with no admixture from any foreign source, there seems to be no reason why the language should undergo any material change. Children must continue to learn their speech from their parents; and grandfather and grandchild must so speak as to be mutually understood. There is doubtless a natural inclination for change in the human mind; but in the case of language this inclination is checked by many powerful conservative influences—by authority, affection, custom, and necessity. Accordingly, we see that the Chinese language has remained substantially the same for more than four thousand years. The Greek schoolboy of the fourteenth century after Christ read his Hesiod or his Herodotus far more readily than an English lad of the present day can read the works of Chaucer or of Mandeville Two thousand years in the one case had wrought less change than four hundred have produced in the other.

The causes which originate the great changes in speech, rendering some languages obsolete, and creating new idioms in their place, are two in number, both powerful in their way, and neither of them having anything directly to do with intellectual advancement. In fact, as has been hinted, the first tendency of both of them would rather be toward impoverishment alike in the arts of life and in speech. These causes may be briefly defined as conquest and migration.

The English language affords the most familiar and the most striking example of the change produced by conquest. The subjugation of the Anglo-Saxons by the Normans reduced their language from a highly inflected tongue to what has been styled (though with some exaggeration) a grammarless speech. The three genders, which were carefully indicated in both noun and adjective, ceased to be distinguished. All but one of the five cases were lost. The half-dozen different modes of forming the plural were reduced to one—only a few faint relics of the older forms remaining to show that they had existed. The subjunctive mood, feebly kept alive by grammatical purists, disappeared from the common speech. Many of the formative particles—prefixes and suffixes—which abounded in the Anglo-Saxon, and gave it an exuberant life, died out of the language; and in their place a few incongruous elements were adopted from the speech of the conquerors. In general, however, the grammatical forms which remained were relics of the original language. At the same time a vast number of Anglo-Saxon words disappeared entirely, the places of many, though not all, being supplied by words of Latin origin, usually much corrupted and distorted in pronunciation. In short, the English speech, as it finally emerged after this great linguistic cataclysm, was a mere jargon or "camp language,"—a *lingua franca,* in which the people of the two foreign nations, now forcibly intermingled, managed to make themselves understood by one another. To speak of this mangled and degraded "pidgin English" as an analytic tongue, and to exalt it as the product of an improved civilization, is simply preposterous. No doubt the strong intellectual powers of the two mingled races speedily made themselves manifest in this new medium of expression, and fashioned it into a language possessing many fine qualities of its own. It has drawn some valuable elements from both the idioms of which it is composed, and may thus be said in certain respects to surpass each of them, especially in the means of discriminating the nicer shades of thought. The highest poetry, eloquence, and philosophy have found it adequate to their needs. To discuss the question whether the language of Shakespeare and Chatham is superior or inferior to the languages of Cicero and Alfred would be idle. There is no arbitrator qualified to decide such a dispute. The question with which we are now concerned is different. It is quite clear that the paucity of inflections in the English nouns and adjectives is no more an evidence of progress than their abundance in the German is a proof of mental sluggishness and linguistic stagnation. The English Teutons were conquered by a people speaking a different language; the German Teutons remained independent. The English lost by the conquest many inflections which the Germans retained. To maintain that the English speech has reached its present state by a process of analysis is as absurd as it would be to say that the gardener who trims a shrub for the purpose of converting it into a hedge-plant is analyzing it. The bush was needed for a new purpose, and to subserve this purpose it has been forcibly reshaped and made less luxuriant, but more symmetrical, than before.

The same explanation applies to the Romanic languages, but with a difference. The Normans, when they conquered England, were, like those whom they subdued, a civilized and christianized people. In the mixed speech which arose after the conquest, the influence of the more numerous Saxons prevailed, so far as to secure the adoption of their Teutonic grammar; but a large mass of vocables was supplied by the language of the conquerors. The heathen and barbarous Goths, Vandals, and Franks, after their easy conquest of Roman and Christian Italy, Spain, and France, were content to renounce almost entirely their own speech, and to learn in their rude way the language of their subjects, merely dropping many of the forms, and altering the pronunciation of the words to suit their own habits of utterance. Such and no other was the origin of the Italian, Spanish, and French languages, in which there is certainly no evidence of conscious analysis or of intellectual progress.

The other influence to which the loss of inflection and of vocal elements is due, is that of migration. A colony which leaves the mother-colony to found a new community is usually composed mainly of young people, and often of persons belonging to the lower orders. It will comprise comparatively few individuals advanced in years or belonging to the wealthy and governing classes. These, however, are the natural conservators of language. They remain at home, where the speech is preserved pure and unchanged. The emigrants, few in number and occupied by the toils and anxieties of their new life, have little regard for the accuracies of speech. The easiest utterance by which they can make themselves understood suits them best. If one past tense will answer as well as two, they will be satisfied with one. If any case-endings can be dispensed with, they will cease to use them. If any consonantal elements seem to them difficult of utterance, and not needed for the scanty vocabulary of their ordinary intercourse, they will drop them. The language will thus become gradually simplified and impoverished, both in its grammar and in its lexicon. The difference between the alteration produced in this manner and that arising from conquest is chiefly apparent in the fact that the change produced solely by emigration is mere loss, and is not complicated by the introduction of new words and forms, or by the distortion of those which are retained.

It is evident that in most cases these two causes of change,—migration and conquest,—will be acting together. Conquerors are usually emigrants, and emigrants are frequently conquerors. It is not always easy to judge how far the alteration of language is due to one cause or the other. There is, however, one region in which we are fortunately freed from doubt on this point. The islands of Polynesia have been settled within comparatively recent times; and in almost every case the uniform tradition of the natives affirms that the groups or single islands at which their colonizing ancestors arrived were uninhabited.

The traditions of the Hawaiians, with the evidence derived from a comparison of languages, show that their islands were settled by emigrants from the Marquesas (the nearest inhabited land) about forty-six generations, or about fourteen hundred years, ago. The inhabitants of the Marquesas trace their descent partly from Tahiti and partly from Vavau, one of the Tonga (or Friendly) Islands. And the people of Tahiti trace back their ancestry to the Navigator Group (Samoa) which, with the neighboring group of Tonga, was apparently the primary centre, or mother-country, of the Polynesian race. The emigrations from these western mother groups to the eastern clusters must have taken place at least two thousand years ago. The carefully preserved genealogies of the Marquesan and Hawaiian chiefs are sufficient evidence on this point.*

Now in comparing the languages of the eastern, or emigrant, communities with those spoken in the western, or mother groups, we are struck by the very slight changes which they have undergone, in words and grammar, during this long period of over twenty centuries. They still constitute, in fact, but dialects of one general language. The Samoan is nearer in words and pronunciation to the Hawaiian than the Portuguese is to the Spanish, or than the Lowland Scotch is to the English. Hundreds of words in the eastern and western groups are absolutely identical. The remainder differ chiefly in certain regular permutations, of which the rules are easily understood. These permutations are all in the direction of simplicity and ease of pronunciation. The *f* and *s* of Samoa both become *h* in Hawaii. The Tongan (or original Polynesian) *k* is dropped altogether in Hawaiian (as it has also been in Samoan), its place being supplied by a slight catching of the breath. *Ika*, the word for fish in Tongan and New Zealand, is pronounced *i'a* in Samoa and Hawaii. The nasal *ñ* (ng) become simply *n* in Hawaiian. *Maña*, which in Samoan and Tongan is branch, becomes *mana* in Marquesan and Hawaiian.

The few grammatical changes are in the same direction of greater simplicity. The Samoan has several particles which are affixed to the verb to give it the sense of the passive participle. These particles are *a*, *ia*, *fia*, *ñia*, *tia*, and *ina*. Thus, from *ufiufi*, to cover, we have *ufiufía*, covered ; from *taofi*, to hinder, *taofi-ía* hindered ; from *sila*, to see, *silafía* ; from *ita*, to hate, *itañía* ; from *si'i*, (for *sik'i*) to lift up, *si'itía* ; and from *ave*, to give, *ave-ína*. In Hawaiian, these affixes are reduced to two, *a* and *ia*, as in *lohe-a*, heard, *lawe-ia*, taken. Of two or three others, some traces remain in isolated forms, as in *auhuli-hia*, driven away ; *tau-lia*, hung up, and *pili-tia*, crowded close. The Marquesan has *a*, *ia*, *hia*, and *tia* ; while the Tahitian has reduced all the suffixes to the single form *hia*.

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* See the subject fully discussed in the "Ethnography and Philology of the U. S. Exploring Expedition," (under Wilkes) p. 117, and in the elaborate work of the late Judge Fornander of Hawaii, on 'The Polynesian Race." A great scientific authority, M. de Quatrefages, has summed up the facts and arguments in his volume "*Les Polynésiens et leurs Migrations*," which decisively settled this interesting question.

In the demonstrative pronouns, the Samoan makes a distinction between the singular and the plural, which is lost in the western dialects. *Lenei*, in the former, means this, and *lena* and *lela* (or *loa*), that ; *nei*, *na*, and *ia*, are these and those. In Hawaiian, *teia*, *eia*, and *neia*, all alike, mean this and these ; *tela* and *ia* both mean that and those. In our own language, it is well known that the plurals "these" and "those" are seldom used by the uneducated classes ; they say not "those boys" but "them boys." If a boatful of illiterate men and women from England or the United States were to be cast on an unoccupied island, and to found a colony there, we may be sure that the proper plural forms of the demonstrative pronouns would not be found in the colonial idiom.

The result of our brief review of this most interesting linguistic field is to show that the Polynesian languages afford a crucial test and decisive proof of four most important principles of linguistic science :

1st. That the rate of change produced by lapse of time in unwritten languages, when not affected by conquest or other external influences, is extremely slow. The only change which the Samoan language seems to have undergone in two thousand years is the loss of the *k* sound, which is replaced by a slight hiatus or catching of the breath. It may be added that the evidence derived from the American languages is all in the same direction.

2nd. The change in a speech produced by emigration, when not complicated by intermixture with other languages, is considerably greater than that produced by mere lapse of time, but is still not rapid, and not important. After two thousand years the descendants of the Samoan emigrants can still understand with little difficulty the language spoken in the mother-country.

3rdly. The changes caused by mere lapse of time or by emigration, unaffected by foreign influences, are usually governed by definite rules, and rarely lead to irregularities and distortions, either in phonology or in grammar.

4thly. The changes which are thus produced are invariably in the direction of greater simplicity. A vocal element or a grammatical inflection may be lost or modified, or exchanged for another; but no new element or inflection is ever introduced. The introduction of a new vocal element, like the Arabic guttural in Spanish, and the Hottentot "click" in the Zulu speech, is a sure mark of foreign influence.

The conclusions to which we have thus been brought as to the widely different effects produced on speech by conquest accompanied by mixture of languages, and by mere migration, not attended with such mixture, lead to very interesting results when applied to historical and ethnological questions. Among the most important of these questions is certainly that of the early peopling of Europe.

If the Aryan emigrants, who, in prehistoric times, overran Europe in successive waves of migration, had found their new abodes wholly unoccupied, there is no reason for supposing that the languages which their descendants now speak would differ much more from one another in grammar or vocabulary than the Polynesian languages now differ among themselves. The actual differences, however, are immensely greater, and are of such a nature as to leave no doubt that they have been caused by the attrition of different idioms and habits of utterance, brought together in forcible collision.

Recent researches have shown that Europe, or the greater portion of it, was occupied in early times by a non-Aryan population, belonging perhaps to more than one race. Scholars are agreed in recognizing in the Euscarians, or Basques, the survivors of at least one section of this primitive population; and most archæologists identify them with the Iberians, who in the earliest historical period still held large portions of France and Spain, and of whom Tacitus discovered traces in Great Britain. The language of the Basques belongs to the polysynthetic class, and, like all languages of that class, is exceedingly difficult of acquisition. The Aryan conquerors would naturally not attempt, like the Teutonic conquerors of southern Europe or the Norman conquerors of England, to acquire the speech of their subjects. Like the Roman conquerors of Gaul, they would retain their own language, but in such a simplified form as would adapt it for communication with the conquered people. The mingled race would speak an idiom which would be in the main Aryan, but would have lost many vocal elements and many grammatical inflections. The new language would be to the primitive Aryan what the English is to the German, or what the French is to the Latin. It would be a less complex speech, and more easy of pronunciation; and while the mass of its vocables would be of Aryan origin, but much corrupted and abbreviated, there would be in it a considerable number of words derived from a different source. This description applies to all the European languages of Aryan stock, from the Greek to the Celtic; but the change and corruption are greater, as might be expected, the further west we advance.

Thus the application of the elementary principles of comparative philology disposes of the hypothesis of the European origin of the Aryan race, which some eminent scholars have lately maintained on various and often contradictory grounds. The notion that the Aryan speech could have originated among the comparatively simple and formless idioms of western Europe, and, advancing eastward, could have yielded such highly complex languages as the Zend and the Sanscrit, is one which finds no countenance in the laws of linguistic science, or in any known example of a like evolution. Nor should it be objected that the ancient Aryan tongues of Europe, as they are known to us, are of later date than the ancient Aryan tongues of Asia, and may therefore have suffered more disintegration and loss by the mere lapse of time. The facts do not sustain this objection. We know the condition of the Greek and the Latin in the fourth century before Christ, when the Sanscrit and the Zend were flourishing tongues; and we know the character of the Mæso-Gothic language at a date not very much later. Greek, Latin and Mæso-Gothic alike show evidences of the loss and distortion caused by the violent impact of other tongues. Conquest and migration—the migration of the Aryan hordes into Europe, gradually overpowering and absorbing the earlier populations—will alone account for the appearances which these ancient Aryan languages of Europe present to us.

The objections which have been made to the new theory of the origin of languages, in the form in which it was set forth, very briefly and imperfectly, in my former essay on the subject, resolve themselves into two, which take the form of questions. The first proceeds from philologists who are inclined to accept the theory, but ask for more evidence, and particularly for evidence that children would be able not only to invent a speech, but also, as they grew older, to endow this speech with inflections. The other objection comes from those who have heretofore held the common and, it may be said, natural view that inflected languages are the growth of ages of slowly accumulated culture. They ask for evidence that languages equal in variety of inflections, in the capacity for subtle distinctions, and in comprehensive power of expression, to the classic Aryan and Semitic tongues, have ever been found among barbarous peoples.

These objections, or rather inquiries, are both entirely reasonable; and both have been presented, with equal courtesy and force, by very eminent authorities,—the first, for example, by Professor Sayce, who in his late most interesting address, as President of the Section of Anthropology in the British Scientific Association, while complimenting the theory as "very ingenious," and pointing out, more clearly than its author had done, its utility in explaining some important linguistic problems, yet demurs to the sufficiency of the evidence thus far offered; the second by an illustrious statesman and scholar, who has done me the honor of turning aside for an hour from the affairs of empire, and from Homer, to consider the views suggested by me, and to discuss them with his usual candor and acuteness. I need not add that any suggestions proceeding from Mr. Gladstone on a question of philology must always deserve the most respectful consideration.

On the question of the capacity of children for inventing entirely new words and forms, evidence is steadily accumulating. For the present, it will be sufficient to present one testimony which, alike from its source and its character, will be found eminently satisfactory. It comes from a very distinguished German professor, the first Sinologist of Europe, himself the son of a master of philological science. The child-language to which it refers is that of his own nephew. What is specially remarkable is that the novel words and forms were not employed in converse with another child, but were the spontaneous products of the child's own linguistic faculty. That this faculty should be particularly strong in a grandson of Dr. Hans Conon von der Gabelentz, and a nephew of Dr. George von der Gabelentz, will surprise no one. I give the particulars precisely as they have been furnished to me by Professor von der Gabelentz, and in his own happily worded English:

> "My brother Albert's eldest son George, before he had learned his mother-tongue, called things by names of his own invention. In these names the constant elements were the consonants, while the vowels, according as they were deeper or higher, denoted the greatness or smallness. For instance, his term for ordinary chairs was "*lakail,*" apparently quite a self-made word. Now, he would call a great arm-chair "*lukull,*" and a little doll's chair "*likill.*" The root for round objects was *m—m.* He called a watch or a plate "*mem,*" but a large dish, or a round table "*mum*;" the moon was likewise "*mem,*" but when he first saw the stars, he said "*mim—mim—mim—mim.*" His father and, at first, every grown-up male person, was called *papa,* till he learned to distinguish between Papa and Grosspapa (*o-papa*) and henceforth called all other gentlemen *o-papa.* Now, I am a head taller than was my father. So, one day, when seeing my father and me together, baby called the former "*o-papa,*" and me "*u-pupu.*" One day in winter he saw his father in a large fur cloak and with his hat on. This impression he uttered with the word "*pupu,*" meaning a very big papa. The boy soon gave up his idioglottic endeavors, learning German before his next-born sister had reached the age of beginning speech. So *that* language could have no further grammatical development."

In this most interesting case, we see clearly how the Semitic system of inflection, with internal vowel changes, may have originated. If this highly gifted child had been left with an equally intelligent girl, to grow up by themselves, after the death of their parents, in some sheltered or fruitful nook or oasis of Arabia, Oregon, Brazil, or Central Africa, can we doubt that they would, by the time they had reached maturity, have framed for themselves and their posterity a language as elaborate, varied, and complete as the Arabic or the Sanscrit—or as any of those still more remarkable languages of which an account has now to be given, in response to the other class of inquiries?

The opinion which prevails widely among scholars, and is sustained by many treatises on philology of very high reputation, that the languages of the Aryan and Semitic families are the only tongues in which genuine inflections are found, and that the variations in all other languages are of a purely agglutinative character—which sometimes merely simulates inflection—is an opinion which, though once seemingly warranted, could only have retained its hold through the neglect of students to investigate fully the facts that have been steadily accumulating during the last half-century. It is now time to prove by the highest evidence, accepted by the best authorities, that this opinion is utterly erroneous. If it can be shown that languages as clearly inflectional and as happily expressive as any of the Aryan or Semitic tongues are spoken by tribes in a low, almost the lowest, stage of barbarism—in regard to whom the idea of a gradual growth of linguistic development by slow accessions of culture would be an utter absurdity—the propositions required by our theory will probably be deemed to be sufficiently established.

When, many years ago, it fell to my charge to make the first ethnographical survey of Oregon, I found in that region several families of languages remarkable for the great number, variety, and expressiveness of their grammatical variations. Among these, the most striking, so far as the knowledge which I then gained would enable me to judge, was the Sahaptin family, comprising two principal languages and several dialects. Of the leading language, the Sahaptin—then spoken by a tribe of about two thousand persons, commonly known among the whites as the Nez-percés,—I was so fortunate as to obtain a complete account from a very able and accomplished American missionary, the Rev. A. B. Smith, who had resided three years among them, and who kindly placed in my hands his manuscript grammar, comprising one of the most thorough and profound analyses ever made of an unwritten tongue. Its accuracy I had good opportunity of testing, while procuring an extensive vocabulary from the natives, with the aid of another highly educated and indefatigable missionary, the Rev. Dr. Whitman,—whose deplorable fate, which befell him, with his family, a few years after I met them, (their massacre by another Indian tribe) forms one of the saddest tragedies in the history of modern missions.

The Sahaptin is throughout an inflected language. Its nouns have eight cases—nominative, genitive, accusative, two datives and three ablatives. They have two numbers, the plural being formed from the singular, for the most part, by a syllabic reduplication, similar to that which forms the perfect tense in the Sanscrit, the Greek and the Mæso-Gothic. Thus *pitin*, girl, makes in the plural *pipitin; atwai* old woman, *aatwai; tahs*, good, *titahs*. To this rule there is an exception in the case of words expressing the various family relations, where the plural is formed by adding *ma* to the singular, as *pika* mother, pl. *pikama*. The adjectives are varied like the substantives and agree with them in case and in number. The following are the case variations:

Nom.	*init*, house	*tahs*, good
Gen.	*ininm*, of a house	*tahsnim*
Acc.	*inina*, house	*tahsna*
1st Dat.	*initph*, to or for a house	*tahsph*
2nd Dat.	*initpa*, in or on a house	*tahspa*
1st Abl.	*initki*, with a house (instrument)	*tahski*
2nd Abl.	*initpkinih*, from a house	*tahspkinih.*
3rd Abl.	*initain*, for the purpose of a house,	*tahsain.*

It will be seen at once, in the dative and ablative cases, how much more "profoundly reasoned and accurately classified" (to use an expression which I shall have occasion to quote from Professor Max Müller) are the Sahaptin case-distinctions than the Aryan.

It is possible, and indeed probable, that both in the Sahaptin and in the Aryan languages the case terminations, or many of them, are relics of primitive prepositions; but if so, all traces of such prepositions seem to have vanished, at least from the Sahaptin. If they once existed, it was, I believe, in the primitive household in which the language was first formed and brought to its fullest maturity, while all the members were still united.

There is, however, fair reason for questioning whether the case terminations may not, in some instances, have been, from the first, pure inflections, or phonetic changes, suggested by the language-forming faculty, to express distinctions of meaning. As Professor Sayce has well suggested in his "Principles of Comparative Philology," the original Arabic case-endings, which are the three primary vowels, *a*, *i* and *o*, either pure or nasalized—and which, as Orientalists suppose, formerly prevailed throughout the Semitic languages—could hardly have originated in any other way. And certainly the variations by internal vocalic changes, so characteristic of the Semitic languages, and so common in the Aryan tongues, could not have sprung from any agglutinations.

These internal variations are frequent in the Sahaptin, and are particularly notable in the conjugation of the verb. The Sahaptin verb far surpasses both the Aryan and the Semitic in the variety of its forms and the precision and nicety of its distinctions. It has six moods—indicative, usitative, suppositive, subjunctive, imperative, and infinitive. There are nine tenses—present, perfect, recent past, remote past, aorist or past indefinite, present future, indefinite future, recent past future, remote past future. Each verb has two verbal adjectives or participles, three verbal nouns, and an adverbial derivative. Further, each verb has many forms, analogous to the Hebrew conjugations. Thus *hakisa*, to see, has a reciprocal form, *pihakisa*, to see each other; a reflective form, *inaksa*, I see myself; a causative form, *shapaksa*, to cause to see, to show; a successive form, *wiaksa*, to see one thing after another; and a transitory form, *takaksa*, to see suddenly, or for a short time. But it is impossible, in such a mere outline, to give anything like an adequate idea of the richness of the verb in this remarkable speech. The point, however, to which attention is particularly to be directed, is that the variations are evidently inflections, pure and simple. This is shown by the fact that many of them are produced by changes in the primary elements, both vowels and consonants: thus from *hakisa*, I see, we have (among a vast variety of similar changes) *aksaka*, (recent past) I have just seen him, *aksana*, (remote past) I did see him, *ahahna*, (aorist) I saw him, *aktatasha*, (present future) I am about to see him, *ahnu*, (future) I shall see him, *ahnah*, (usitative) I am wont to see him, *akinah*, (suppositive) if I see him, *ahnim*, (imperative) see him! *hahnash*, (infinitive) to see.

More remarkable, in certain respects, is the substantive verb. The common opinion, expressed in philological compendiums, is that the verb of pure existence is the highest outcome of culture and reflection in the Aryan and Semitic languages; and scholars have exhausted their ingenuity in tracing its supposed origin and primitive meaning. In the Sahaptin we find this verb used frequently, as the missionaries affirm, and in precisely the same sense as in Greek and English. By a curious coincidence, its form bears a remarkable resemblance to that of the Aryan verb. Its root is *ash*. In Sanscrit, the corresponding root is *as*, which some philologists suppose to have originally meant either "to breathe," or "to dwell." But the example of the Sahaptin would seem to show that there is no necessity for resorting to any such derivation, and that the verb may well have been an original invention of the earliest makers of each tongue. The first three tenses in the conjugation of this verb will show that its forms are as completely inflectional as those of the Sanscrit, the Greek, or the German:

PRESENT TENSE.

wash, I am	*washih*, we are
awash, thou art	*athwashih*, ye are
hiwash, he, she, or it is	*hiushih*, they are

PRESENT PAST TENSE.

wáka, I have just been	*wâsheka*, we have just been
awáka, thou hast etc.	*athwâsheka*, ye have, etc.
hiwâka, he has, etc.	*hiusheka*, they have, etc.

REMOTE PAST TENSE.

wāka, I was	*washina*, we were
awāka, thou wast	*athwashina*, ye were
hiwāka, he was	*hiushina*, they were

Wâka, I have just been, differs from *wāka*, I was, solely in the different shade of the principal vowel sound, the *â* in the former having the sound of *a* in "wall," and the *ā* in the latter the sound of *a* in "father." A clearer instance of a pure inflection of the Semitic cast could not be found in any language.

Another very curious coincidence between this verb and the Aryan substantive verb deserves to be mentioned. The Sahaptin *ash*, like the Aryan *as* or *es*, is deficient in several tenses and moods, and these are supplied, as in the Aryan, from another verb, meaning "to become." This verb in Sahaptin is *witsasha*, I become, which makes in the perfect *witsash*, I have become or been, (corresponding to the Latin *fui*, from a root meaning to grow,) in the aorist, *witsaia*, I became or was, and in the future *witsaia*, I shall become or be,—all purely inflective forms.

How completely the Sahaptin verb corresponds in meaning and in usage to the Aryan is shown by the examples given by Mr. Smith. Thus the phrase "what I have said is true," reads in the Sahaptin :—

ioh	*kah*	*tsekaku*	*ikuin*	*hiwash*
that	which	I-have-said	true	it is,

answering word for word, and inflection for inflection, to the Latin "*id quod dixi verum est.*" So again,—with a slight idiomatic variation in the order of the words—a Sahaptin would say, for "one is about to go who is skilful,"—

naks	*hikutatasha*	*ka*	*ipi*	*wapsu*	*hiwash*
one	is-just-now-going	who	he	skilful	is.

Of the immense wealth of inflections possessed by the Sahaptin verb, some idea may be formed from the fact that the paradigm of the verb "to see," in its primary or simple conjugation, occupied in Mr. Smith's grammar no less than forty-six pages of manuscript; and this did not include the six derived conjugations, each of which possesses all the variations of the simple verb. It must not, however, be supposed that the Sahaptin is limited merely to inflectional forms, and that it has no capacity for agglutination. Were this the case, it would be far inferior to the Aryan languages, in which agglutination, or, in better phrase, composition, plays a most important part. In fact, it may be said to be chiefly in this capacity that the Aryan languages surpass the Semitic. And it is deserving of remark that our admiration is given to the Aryan languages in precisely the proportion in which they possess this power of composition or agglutination. If we deem the English, which can promptly manufacture at need such words as railroad, steamboat, and firework, superior in the power of compact expression to the French, which can only say *chemin de fer*, *bateau à vapeur*, and *feu d'artifice*, we no less admit the much greater superiority of the Greek, to which we constantly resort for such agglutinative forms as telegraph, photograph, spectroscope, pyrotechnics, electrotype, and hundreds like them. The power of composition in most of the American languages, instead of being, as some have imagined, a mark of inferiority, is in reality, as Duponceau long since pointed out, one of their chief claims to our admiration.

Before giving a typical example of this power in the Sahaptin, I may refer to the theory put forth by Professor Sayce in his "Principles of Comparative Philology," and maintained by him with much force of argument,—that all language begins with the sentence, and that the separate words which compose the primitive sentence are the product of later analysis. Against this view it has been urged that, in the nature of things, analysis, or, rather, the single elements, must precede synthesis. We must have the elements before we can put them together. The whole question, however, becomes clear if we bear in mind that all languages must have begun on the lips of children, and that no young child, when beginning to speak, ever yet uttered a sentence. As has been already remarked,—and as every parent knows,—the child begins with single words, and usually with monosyllables, or at the most dissyllables. As he grows older, he puts his words together; he compounds and inflects them. Finally, when full grown, he utters his thoughts in sentences, in which, unless with a conscious effort, he rarely thinks of the word, and never of their roots. Thus, since all completed language is only known to us in this final stage, or as it is spoken by grown people, Professor Sayce's theory, perplexing as it seems at first thought, is fully justified by the facts.

The word which Mr. Smith gave me as an example of the remarkable power of composition in the Sahaptin is one which, since it was first published, has been often quoted. Though long, it is anything but harsh or hard. On the contrary, it is both euphonious and, to one familiar with the language, evidently easy of comprehension. It is a word of nine syllables, forming several distinct groups,—*hi-tau-twala-wihnan-kau-na*; and it means "he travelled by on foot in a rainy night." This, it will be seen, is a complete sentence, and it is one which is very easily analyzed. The first syllable, *hi*, is the prefix of the third person singular; it bears a curious resemblance in sound and meaning to the English pronoun "he," but is used only as a prefix—that is, as an inflection; for the separate pronoun meaning "he" is *ipi*. *Tau* has reference to anything done in the night—*tuala* to an action performed in the rain; but these expressions are never used alone, and are not derived, so far as is known, from any verbal root. *Wihnan* is from the simple verb *wihnasa*, to travel on foot. The verbal noun, which is the simplest form of the root, is *wihna*; the last *n* in the compound form seems to be added merely for euphony. *Kau* is from the verb *kokauna*, (root *kokaun*) to pass by. *Na* is the suffix of the indicative mood, aorist tense, direction from the speaker. A literal version of this most picturesque and expressive sentence-word would be—"he, at night, in the rain travelling on foot, passed by, away from me." By three additional, syllables we can bring the verb into the causative conjugation, and change the direction of the movement towards the speaker: *Hi-shap-a-tau-tuala-wihnan-kau-nim-a* will signify "he made him travel this way on foot in a rainy night."

But it may be said that to form and preserve such a language as the Sahaptin or the Sanscrit, something more than a strong linguistic faculty is needed, both in its first framers and in their descendants. There must be higher endowments—powers of combination, of memory, of abstraction, of logical reasoning, working perhaps unconsciously, but still working effectively and constantly.

This view is apparently a just one, and it is proper to show that the circumstances in the present case fully confirm it. While gathering the language of this tribe, I had occasion to study their character, and an excellent opportunity of ascertaining it from the missionaries and other white residents. At that time I wrote of them—"The Sahaptins or (*Nez-percés*), are the tribe who, several years ago, despatched a deputation to the United States, to request that teachers might be sent to instruct them in the arts and religion of the whites. Their good dispositions have been much eulogized by travellers, and there seems to be no reason to doubt that they are superior to the other tribes of this territory in intellect and in moral qualities." Nearly thirty years after this measured commendation was published, the whole continent rang with the praises of the intellectual power, the eloquence, the military skill, the unconquerable firmness, the magnanimity, the humanity, and the other noble qualities of these remarkable barbarians. In the admirable work of that able and fair-minded historian, Mr. J. P. Dunn, entitled "The Massacres of the Mountains," a narrative is given, drawn from official documents and other authentic sources, of the outbreak of the Nez-percés in 1876. After enduring many wrongs with unexampled patience, they resisted at last an order so manifestly unjust that the military officers charged with its execution had protested against it—an order to deprive them of their lands. They were led by their famous chief, "Nez-percé Joseph," whom the historian pronounces "the ablest uneducated chief the world ever saw." In the preliminary negotiations, the American commissioners reported that "he exhibited an alertness and dexterity in intellectual fencing that was quite remarkable." His influence long withheld his people from rising. When they could no longer be restrained, he put himself at their head, and displayed as a leader talents worthy of Hannibal or Sertorius. He gained battles by most ingenious strategy, and, when repulsed by numbers, proved himself as formidable in retreat as in advance. Unable to maintain his ground against the forces of the American army, he adopted a bold resolution. The famous "Retreat of the Ten Thousand" was about to be surpassed by these indomitable barbarians. Gathering his whole tribe, old and young, women and children, with his mounted warriors in front and rear, Joseph took up his desperate march, far eastward and northward, towards the Canadian line. The distance was a thousand miles. The track led over the Rocky Mountains in their ruggedest defiles, through wide rivers treacherous with quicksands, and across long stretches of broken and arid plains. The pursuing troops, guided by Indian scouts—the savage Bannocks—hung upon the rear of the fugitives. Other troops from the forts on the plains came hurrying to intercept them. Joseph fought his way through all, defeating them, capturing horses and ammunition, and in one instance a howitzer. His warriors who fell were scalped and mutilated by the Bannock scouts; their women when captured were subjected to every indignity. The Nez-percés refused to retaliate. No slain enemy was scalped by them. The white women who were taken were dismissed by them unharmed. Their conduct and their wrongs awakened the sympathy even of the rude pioneer settlers. When these were called upon to assist the soldiers, they replied, in their expressive frontier phrase, that they "had not lost any Indians," and consequently had no occasion to hunt for any. They traded peacefully with them, and let them pass. At length the much harassed and weakened, but still undaunted, band reached a position within thirty-five miles of the British boundary. One day's march would have placed them in safety, when a powerful force from Fort Keogh—cavalry, infantry, and artillery—suddenly confronted them and barred the way. Surrounded on all sides, the Nez-percés fortified themselves and stood so resolutely at bay that their pursuers—fortunately led by an officer noted for his benevolent disposition, and detesting the task cast upon him—were glad to give them almost their own terms of surrender. "Thus," says General Sherman, in his official report as Commander-in-Chief of the American army, "has terminated one of the most extraordinary Indian wars of which there is any record. The Indians throughout displayed a courage and skill that elicited universal praise; they abstained from scalping, let captive women go free, did not commit indiscriminate murder of peaceful families, which is usual, and fought with almost scientific skill, using advance and rear guards, skirmish lines, and field fortifications." To this our author adds that when the captives were taken down the Missouri River, the people along that stream, who had been used to Indians all their lives, were constantly remarking, "What fine-looking men!" "How clean they are!" "How dignified they appear!"

To sum up our argument,—if we affirm that the Aryan speech, with its many excellences, could only have originated among a people of singular intellectual capacity—a capacity which, as we proudly, if somewhat vaingloriously, claim that they have transmitted to their descendants—is it not a clearly logical conclusion, from similar premises, that the exquisitely framed and admirably expressive Sahaptin tongue was composed by speakers endowed with at least equal genius, which they, too, have bequeathed to their posterity?

But the Sahaptin is not the only inflected language of this superior stamp in America. There are others whose excellence is attested by authorities of the highest rank in philological science. Among these are the languages belonging to the great Algonkin family. This wide-spread family might well be styled the Aryan stock of America—stretching as it does, or did, from Nova Scotia to the Rocky Mountains, and from Hudson Bay almost to the Mexican Gulf, and comprising more than twenty languages as different from one another as the Portuguese is from the Roumanian. All these languages—the Lenâpé (or Delaware), the Micmac, the Massachusetts, the Mohegan, the Ojibway, the Cree, the Miami, the Blackfoot, and the rest—are remarkable for their abounding inflections, their subtle distinctions, their facility of composition, and their power of expressing abstract ideas. It was Duponceau, the father of American philology, who first brought these qualities to the notice of students more than sixty years ago, in his published correspondence with the missionary Heckewelder (1816), in his preface to his translation of Zeisberger's Delaware Grammar (1827), and in his famous "Mémoire" on the subject, which received from the French Institute the "Volney Prize," in 1835. From his preface to the Delaware Grammar a few paragraphs may be cited, which will amply confirm all that I have stated on this question. After describing their happy mode of forming compound words, he adds:—"They have also many of the forms of the languages which we so much admire—the Latin, Greek, Sanscrit, Slavonic and the rest—mixed with others peculiarly their own. Their conjugations are as regular as those of any language that we know, and for the proof of this I need only refer to the numerous paradigms of Delaware verbs that are contained in this grammar, in which will be found the justly admired inflections of the languages of ancient Europe." "There is," he adds "no shade of idea in respect to the time, place, and manner of action which an Indian verb cannot express." As an instance, he gives the Delaware phrase for "if you do not return," and compares it with a similar expression in European tongues. The Delaware is, "*mattatsh gluppiweque,*" which is thus explained: *matta* is the negative adverb, no; *tsh* is the sign of the future, with which the adverb is inflected; *gluppiweque* is the second person plural, in the present subjunctive, of the verb *gluppiechton*, to return. The sentence thus clearly expresses every idea intended to be conveyed, including both the futurity and the uncertainty. "The Latin phrase, *nisi veneris*, expresses all these meanings; but the English, "if you do not come," and the French, "*Si vous ne venez pas,*" have by no means the same elegant precision. The idea which in Delaware and Latin the subjunctive form conveys directly is left to be gathered in the English and French from the words *if* and *si*; and there is nothing else to point out the futurity of the action. And where the two former languages express everything with two words, each of the latter requires five, which yet represent a smaller number of ideas. To which of these grammatical forms," asks Mr. Duponceau, "is the epithet 'barbarous' to be applied?"

He then proceeds to express his conclusion on the whole question in measured but weighty words. The astonishing art and method which have presided over the formation of these Indian languages are not, in his opinion, to be considered a proof (as many have been inclined to believe) that this continent was formerly inhabited by a civilized race of men. It is more natural, he holds, to suppose that men were endowed from the beginning with a natural logic, which leads them, as it were, by instinct, to such methods in the formation of their idioms as are best calculated to facilitate their use. He is brought to this decision because he finds that "no language has yet been discovered, either among savage or polished nations, which was not governed by rules and principles which nature alone could dictate, and human science never could have imagined."

Such were the views formed and expressed nearly seventy years ago by the profoundest and most philosophic reasoner that had then devoted himself to the study of the American languages—a reasoner, I may venture to add, who has not yet been surpassed, either in breadth of learning or in depth of thought, by any one who has written on this subject. Fifty years later, another very high authority reaffirmed these views, in even more decided terms. The opinion expressed by Prof. Whitney, in his "Life and Growth of Language," though apparently referring to American idioms in general, evidently relates more especially to those of the Algonkin stock. I have had occasion to quote it elsewhere, but the quotation well deserves to be repeated. "There are," he remarks, "infinite possibilities of expressiveness in such a structure; and it would only need that some native-American Greek race should arise to fill it full of thought and fancy, and put it to the uses of a noble literature, and it would be rightly admired as rich and flexible, perhaps, beyond anything else that the world knew."

To this eloquent passage I would only venture to take one exception. The native-American Greek race has already arisen, and speaks the language in question. A highly endowed language can only have originated with a highly endowed race. When we consider the succession of singularly able leaders whom the Algonkin tribes have produced during the brief term of our intercourse with them, we must feel satisfied that the people to whom these leaders belonged were far above the common rank. As men like Solon, Miltiades, Themistocles, Pericles, Epaminondas, Phocion, and the rest of the long line of Greek worthies, must have sprung from a highly gifted community, so we may be sure that forest statesmen and leaders like Powhatan, Philip of Pokanoket, Miantonomah, Pontiac, Tecumseh, Black Hawk, and, in our own day, Poundmaker and Crowfoot,—men who have won the respect and admiration even of their enemies,—could only have arisen among a people of character and talents corresponding in elevation to their own.

Still another American race may be mentioned, the Iroquois, about whose remarkable abilities there can be no question. As is well known, their famous confederacy, the Five Nations, held, for a long time after the French and English colonies were founded, the balance of power in North America. If they had not, by their hostility to the Huron and Algonkin allies of the French, been led to cast their influence on the side of the English, it is the opinion of competent historians that the whole region west of the Alleghanies, from Canada to the Gulf of Mexico, would now be French. Their happily devised political system, unsurpassed in ancient or modern times, has been well elucidated by the penetrative genius of Morgan. Their oratory, their sagacity, and their prowess have been celebrated by many eminent writers. In their highest prosperity, their numbers did not exceed, probably did not reach, twenty thousand souls. It may fairly be affirmed that, since the world began, so much intellectual force, public spirit, eloquence, statesmanship, and military skill have never, to our knowledge, been elsewhere concentrated in so small a community as that which composed the Iroquois cantons of northern New York in the seventeenth and eighteenth centuries.

The language spoken by this people,—a highly inflected, rich, and sonorous tongue,—is too well known to American scholars to need a minute description. Its stately vocables, fortunately preserved in the names of places, have rescued some of the finest natural features of our continent from the ignoble baptism which has elsewhere degraded others. Onondaga, Oneida, Ontario, Saratoga, Toronto, Ticonderoga, Adirondack,—each a descriptive compound,—mark the euphonic character of the speech. We may well be grateful to an idiom which has preserved the world-famous torrent of Niagara from the too possible designation of "Tompkins' Falls." The wealth of forms and the power of expression in the language have impressed every student. Two hundred and fifty years ago, the scholarly Jesuit, Brebeuf, compared it to the Greek, and found it in some respects superior. In our own day, this opinion has been reinforced by an authority of the greatest weight. Professor Max Müller, who learned the language from a Mohawk undergraduate at Oxford,—now an esteemed physician in Canada,—has written of it in terms of singular force. To his mind, he declares, the structure of the language "is quite sufficient evidence that those who worked out such a work of art were powerful reasoners and accurate classifiers." Powerful reasoners and accurate classifiers! To appreciate the full strength of these expressions, we must consider whether they could be properly applied to the framers of the great classical tongues of the old world, the Aryan and the Semitic; and we must honestly decide that they could not. The irrational and confused gender system of the Aryan, and the imperfect tense system of the Semitic stock, must exclude them from the comparison. It is a noteworthy fact that the two foremost philologists of Europe and America, both devoted students and admirers of the Aryan speech, have compared this speech in its highest development with the leading American tongues, and that both, though differing widely in their linguistic theories on other points, have pronounced in the strongest terms their opinion of the structural superiority of these American languages.

It will perhaps be asked why, if the American language and their framers were of this superior character, the results achieved by the latter have been so small. How did it happen that the Algonkins, the Iroquois, and the Sahaptins remained barbarians of the Stone Age, while the Aryan nations attained the highest pitch of civilization. The question is a fair and pertinent one. The answer is found in a single word,—opportunity. We recognize the prime importance of occasion and surroundings to an individual, but are apt to forget that they are equally essential to a race. We admit that Milton, condemned by fate to ignorance and penury, would probably have remained "mute and inglorious." If the American civil war had not occurred, General Grant would, in all likelihood, have lived and died an industrious tanner in an obscure Illinois town, utterly unconscious of the powers which were destined to make him one of the most famous commanders of modern times. If the Aryan race had been so unfortunate as to make its first appearance on the shores of the St. Lawrence, or on the western prairies, or amid the uplands of Oregon —possessing no domestic animal but the dog, no cereal but maize—surrounded not by civilized nations like the Accadians, the Assyrians, the Phœnicians, the Egyptians and the Chinese, qualified to teach it architecture, astronomy, the alphabet, the smelting of metals, ship-building, the use of the mariner's compass, but by wandering hordes of hostile savages—we have no ground for supposing that this race, whatever might be its natural endowments, would have attained any height in culture beyond that which was reached by the most capable American tribes, whose ill-fortune placed them in that hopeless position.

This is a point which, in its connection with our thesis, requires some further consideration. The doctrine of evolution, whose importance I would in no way depreciate, has, in reference to the intellectual powers of the human race, been strangely misapplied, to such an extent as to lead to serious errors. The misapplication, it must be said, began with Darwin himself; but he, with that noble candor which distinguished him, admitted and corrected the mistake, in which some of his followers still persist. We know how frankly and fully, near the close of his life, he withdrew, on better information, the opinion which he had originally expressed of the low intellectual and moral character of the Fuegians. By just implication, this reversal of his opinion will apply to all savages—for the Fuegians have always been ranked among the lowest of the low. On further consideration, it becomes apparent that this final judgment of the great investigator of nature was in strict accordance with the law of evolution. It is certain that there has been, from one geological age to another, a steady though somewhat irregular increase in the size and complexity of the brains of vertebrate animals. But this increase appears to occur in the transition from one species to another. When a species is once established, there is no evidence (as I am assured by high zoological authority) to show that any material change in the quantity or quality of its brain occurs from first to last. When "speaking man" appeared as a new species on the world's stage, the size and power of his brain was fixed, once for all. There are variations in different races, as there are differences in this respect among children of the same parents; but the variations do not pass certain defined limits, and are constantly tending, as Mr. Galton has shown of the human stature, towards the general average.

Thus it becomes apparent that in the case of man, or at least of speaking man—for if there was a speechless *homo primigenius*, he belonged to another species—the process of evolution, or, more properly speaking, of development, applies, not to his natural capacity, but to his growth in knowledge. Just as his bodily stature and strength have remained the same from the earliest times and in all stages of culture—as his osseous remains and the measurements of existing races clearly show—so there can be no reasonable doubt that his mental stature and force have remained unaltered. We have no reason to doubt—we have every reason to believe—that the earliest Aryans, savages as they undoubtedly were, could reason as profoundly and feel as keenly as the most cultivated of their descendants. As the structure of language depends entirely on the natural capacity of its earliest framers, it is clear that the Aryan tongue, in its primitive form, must have possessed every quality and every power of expression which have ever belonged to it. If, among other barbarians, there have been tribes equal in natural capacity to the barbarous Aryans, their languages will equally show these eminent qualities.

To apply these propositions,—if the language of the latest Aryans possesses and constantly exercises the power of expressing abstract ideas, we may be certain that this power was possessed and constantly exercised by the first Aryan family. And further, among the barbarous tribes of the present day, we may expect to find the same power possessed and exercised, with greater or less fulness, in proportion, not to their degree of cultivation, but to their natural capacity. We should expect that highly endowed communities of barbarians, like the Algonkins and Iroquois, would have languages abounding in abstract and general expressions. Such, in fact, we find to be the case. If we take what Professor Max Müller styles abstract terms of the second degree—the most elaborate if not the most metaphysical of all

—we find them abundant in both tongues. Each language, in fact, has, like each Aryan tongue, a special termination to express these abstractions. In the Iroquois this termination is *sera* or *tsera;* in the Ojibway branch of the Algonkin, it is *win.* Thus, from the Iroquois *katehens,* to be ashamed, (root, *ateh*) we have *atehensera,* shamefulness, ignominy ; from *kennontonnions,* to meditate, (root, *ennonte*) we have *ennontonniontsera,* meditation ; from *katerios,* to fight, (root *erio*), *ateriosera,* strife ; from *kkwenies,* to be able, (root, *kweni*) *kakweniatsera,* ability. The Ojibway *bimadis,* to live, yields *bimadisiwin,* life ; *sagia,* to love, *sagiiwewin,* affection ; *jiga,* widow, *jigawiwin,* widowhood, *bekadis,* mild, *bekadisiwin,* mildness ; *binis,* clear, pure, *binisiwin,* clearness, purity. *Bisan,* quiet, yields two verbal forms, *bisanab,* to be still, and *bisanis,* to be peaceful, and two abstract nouns, *bisanabiwin,* stillness, silence, and *bisanisiwin,* peacefulness—and so on, interminably, through the dictionary.

But it is, perhaps, in the abstract terms of the first degree, the most primitive and in a certain sense the profoundest of all, that this original mental capacity is most strikingly shown. Professor Max Müller, in his "Science of Thought," well observes that, when certain ethnologists "tell us that there are savages who have not a single abstract term in their language, they ought first of all to give us the names of the savages to whose language they refer, and, secondly, they ought to explain how these savages could possibly have formed the simplest names, such as father, mother, brother, sister, hand and foot, etc., without previously possessing abstract concepts from which such names could be derived." To illustrate this pregnant suggestion, let us take some instances drawn from the Indian languages by writers of the best authority. The first word in Professor Max Müller's list is "father." The Hon. J. H. Trumbull, than whom no higher authority on the Algonkin tongues can be adduced, derives this word, *noosh,* in the Massachusetts dialect, from the root *ooch,* which means "from," "out of." "*Noosh,*" he observes, "expresses, primarily, not paternal but filial relation—'I come from him;' *ooshoh* (his father) 'he comes from him,' or with transposition of subject and object, 'he *froms* him.'" In the Iroquois, according to the distinguished Canadian philologist, the Rev. J. A. Cuoq, the word has its origin in a conception perhaps even more subtle.

Rakienha, my father, comes from the verb *wakien*, (root, *ien*), "to have," in what is styled the "diminutive form," which is indicated by the suffix *ha*. *Rakienha* means, strictly, "he who has me little." *Wakienha*, my mother, is the feminine of the verb, and means "she who has me little." The same verbal root supplies the word for son. *Rienha*, my son, means "I have him little."

In the Algonkin, Mr. Trumbull tells us, one of the words for man has for its root *apè*, or (nasalized) *onbè*, which signifies an animal that walks upright, or, more exactly, the one uplifted, from a root *ap* or *omp*, which forms verbs signifying to raise, lift, rise, ascend, and the like. Another is from the demonstrative *in*, this, which is cognate with *nin* or *ni*, I; a man is "such as I," or "such as this one." Dr. Brinton, in his recent work, "The Lenâpé and their Legends," has shown how this demonstrative or pronominal root, *in*, or *ni*, is developed into an extraordinary number of derivatives, abundantly confirming Mr. Trumbull's views. Another root *gisch* or *kich* (where the *ch* is the German guttural), which embraces the general concept of "successful action,"—an idea as purely abstract as can well be imagined,—flowers, according to this author, into an amazing multitude of derivative terms, including *gischigan*, to begin life, to be born, *gischihan*, to form, to make with the hands, *gischelemen*, to create with the mind, to fancy, *gischikenamen*, to increase, to produce fruit, *giken*, to grow better in health, *kikey*, long lived, old, *gischileu*, "it is proved true," *gischuch*, the sun, *gischapan*, daybreak, *gichten*, clear, bright, shining—and so on, almost without end.

Another careful and philosophical investigator, Professor Horsford, in seeking the origin of the Indian name of Boston, "Shawmut," has had occasion to determine the primary sense of its root, the monosyllable *sha*. He finds it to be "parallel-sided," and that this abstract term must have existed in the language earlier than the concrete nouns which have been formed from it, such as *mis*SHA*oh*, the trunk of a tree, *mis*SHA*onk*, the trunk of the human body, *mis*SHA*onh*, the throat, SHA*meek*, eel, and the like. *Um* is a noun-making particle, and *ut* is a locative suffix, signifiying "at" or "near." Thus SHA*um* was the parallel-sided strip of land, the well-known "Neck," which connects the peninsula of Boston with the mainland; and SHA*wmut*, "At (or near) the Neck," became the name of the peninsula itself.

But—admitting that primitive men, barbarians as they were, had the mental capacity which enabled them to invent these general or abstract roots—it will naturally be asked how we can suppose that very young children, whom our theory regards as the first framers of every language, can have possessed this remarkable faculty. Fortunately, we are able to answer this question, not by argument, but by a direct instance; and in such a case, one instance is as decisive as a thousand. The little nephew of Professor von der Gabelentz, a mere baby, just beginning to speak, had invented a root as abstract as the Algonkin *sha* or *gisch*, and with it a formative system seemingly more subtle and metaphysical than the Algonkin, inasmuch as the changes of meaning were indicated, after the Semitic fashion, not by affixed particles, but by internal vowel changes. *Mum* was a flat, circular object of the largest size, the table; *mem* was a smaller disk,—a plate, a watch, or the moon; and when the child was shown at night the "floor of heaven," as Shakspeare's fanciful lover styles it, "thick inlaid with patines of bright gold," he exclaimed, with an instant application of his most diminutive inflection, "*mim, mim, mim.*" Here is an indubitable root, springing from the language-making instinct of an infant, which equals, and in some respects surpasses, those primary elements of speech with which the able investigators of the Aryan, Semitic, and American languages —the Benfeys and Max Müllers, the Ewalds and Renans, the Trumbulls and Brintons—have made us familiar. Yet there is really nothing in this which need astonish us. If the language-making faculty is, like the faculty of sight, a natural endowment and instinct of the human being, we might reasonably expect that a child who can, without effort or consciousness, see a table, a plate, or a star, as clearly as a sage can see them, should be able, without effort or consciousness, to name these objects as aptly as a sage could name them.

We are thus brought back, by the clearest facts and inductions, to the thesis with which our study of the subject began. We find by evidence drawn from the most varied and the most authentic sources—from the utterances of children and the idioms of the most uncultivated tribes—that language owes its origin to a cause which is as active at the present day as it was when speaking man made his first appearance on the earth. To this cause—the language-making instinct of young children—all the great variety of primitive languages, or linguistic stocks, may be confidently ascribed. The explanation thus afforded removes the weightiest stumbling-block which has impeded the progress of philological science, and, at the same time, lays a solid foundation for ethnology, which that science has never before possessed. If this explanation, which has already been accepted as probable by authorities of the first rank, like Huxley, Parkman, Romanes and Sully, and for which other scholars of similar eminence, like Mr Gladstone and Professor Sayce, have only asked further evidence, shall be finally received as the true scientific solution of a great linguistic problem, it will largely modify, not only the sciences which have been named, but also the prevalent opinions on many points of mental, social, and political philosophy of the highest interest. It may therefore fairly claim the serious and candid consideration of all scholars who are interested in these important studies.

NOTE.—Since the foregoing paper was written, my attention has been drawn to the important use which M. Taine, in his profoundly philosophical treatise, "De l'Intelligence," makes of the language of children in explaining the origin of general terms. The portions of the work relating to this subject will be found in his First Book, chapter 1, "on Signs," and in his Fourth Book, chapter 1, on "General Characters and General Ideas." In the former he observes: "The formation of these general names may be narrowly watched with little children; we take them in the act." He gives several examples of childish expressions assuming a general sense through the natural tendency to association of ideas, which at that age is specially powerful. "*In it*," he proceeds, "*we have the faculty of language*." Some of his instances curiously recall those related by Professor Von der Gabelentz, though none of the children displayed the peculiar inflecting turn of the Professor's nephew. "A little boy a year old," writes M. Taine, "had travelled a good deal by railway. The engine with its hissing sound and smoke, and the great noise of the train, struck his attention, and the first word he learned to pronounce was *fafer* (*chemin de fer*). Henceforward a steamboat, a coffee-pot with spirit lamp—everything that hissed, or smoked, or made a noise, was a *fafer*." This is interesting. With the German child it would have been still more so. The steamboat would have quickly become (in French orthography) *foufour*; a tea-kettle would have been *fefer*; and the coffee-pot with spirit-lamp *fifir*. In his Fourth Book the author returns to the subject, and elucidates it by further explanations and examples. "The infant invents and discovers incessantly, and of its own accord; *there is no period of life in which his intelligence is so creative*. The names suggested to him by his parents and the persons about him are but starting points for his innumerable efforts." "There is not even need on all occasions for the words to be transmitted to him with deliberate intention, and by a human mouth; sometimes *the child seizes them in the involuntary sounds he utters*, or in the accidental sounds he catches." And he cites a remarkable example from Francis Lieber ("Smithsonian Contributions to Knowledge," Vol. 2, p. 15):—

> "A member of my own family," says Mr. Lieber, "showed, in early infancy, a peculiar tendency to form new words, partly from sounds which the child caught, as to *woh* for *to stop*, from the interjection *woh* used by waggoners when they wish to stop their horses; partly from symphenomenal emissions of sounds. Thus, when the boy was a little above a year old, he had made and established in the nursery the word *nim* for everything fit to eat. I had watched the growth of this word. First, he expressed his satisfaction at seeing his meal, when hungry, by the natural humming sound, which we might express thus, *hm*. Gradually, as his organs of speech became more skilful, and repetition made the sound more familiar and clearer, it changed into the more articulate *um* and *im*. Finally, an *n* was placed before it, *nim* being much easier to pronounce than *im*, when the mouth has been closed. But soon the growing mind began to generalize, and *nim* came to signify everything edible; so that the boy would add the words *good* or *bad*, which he had learned in the meantime. He now would say *good nim*, *bad nim*, his nurse adopting the word with him. On one occasion he said *fie nim*, for *bad, repulsive to eat.* There is no doubt but that a verb to *nim*, for to eat, would have developed itself, had not the ripening mind adopted the vernacular language, which was offered to it ready made."

M. Taine, though he dwells much and forcibly on the physiological view, including especially the functions of the brain, does not indicate the peculiar light which that study casts on the subject in question. This has been lately done by his countryman, the distinguished anthropologist, Dr. Topinard, in his notable lecture on "The last stages of the genealogy of man," published in his *Revue d'Anthropologie* for May, 1888. After referring to the fact—suggested by an argument of Professor Vogt—that the young monkey is more intelligent than the adult, Dr. Topinard remarks:—"But this greater intelligence of the young is the rule with all animals, including man, if we consider the facts. At this stage the brain is larger, relatively to the body; it is in a manner virgin, more impressionable; it grows extremelv fast, and seeks only to absorb, to work, to turn to use the blood which it receives. What is more marvellous than the way in which our children learn to speak, to read, to write! Should we be capable, we adults, of the amount of rapid memory demanded by the mass of words and ideas which we impress upon them?"

It is satisfactory to be able to adduce, in confirmation of the ideas set forth in the preceding paper, these striking facts and arguments, from two of the highest authorities in Europe on questions of mental philosophy and physiology. For the reference to the passage in M. Taine's book I am indebted to the courtesy of Professor Max Müller, who is naturally interested in the results of an inquiry tending so remarkably to sustain the opinions expressed by him in Bunsen's work, more than thirty years ago. Those opinions, then far advanced and much contested, have now been overtaken and confirmed by the conclusions of inductive science.

A BRIEF NARRATIVE OF THE JOURNEYS OF DAVID THOMPSON IN NORTH-WESTERN AMERICA.

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The following brief sketch of the journeys of David Thompson has been drawn from his Field note-books and journals which are preserved in the office of the Crown Land Department of Ontario. Unfortunately some of the books in the series are wanting, leaving blanks in the record of his travels. Wherever any of these breaks occur the fact is stated, but in some cases I have been able to partially fill them in from records of astronomical observations evidently often dotted down in the book that was most convenient, or sometimes tabulated apart from his journal. This latter is especially the case in regard to his later journeys in the mountains, for which time his journal is not among the books preserved, but there is a carefully tabulated series of a great number of astronomical observations taken during these years, from which his course can be followed with considerable certainty.

For the dates of his birth, marriage and death, I am indebted to the kindness of his daughter, Mrs. Shaw, who is now living in the town of Peterboro', Ontario.

David Thompson was born in the parish of St. John, Westminster, England, on the thirtieth of April, 1770. Of his early life, all that I have been able to learn is that he was educated at Christ's Hospital, or the " Blue Coat School," London, and was perhaps for a short time a student at Oxford. When about nineteen years old he must have entered the service of the Hudson's Bay Company, as in October, 1789, when in the middle of his twentieth year, his journal opens at this Company's establishment at Cumberland House, on the south shore of Pine Island Lake, in the Canadian North-West Territories. He states in a letter written in 1817, that a large brass sextant of Dollond's, of 10 inch radius, and reading to 15″ had been his constant companion for twenty-eight years; so that he had doubtless brought this instrument with him from England in the summer of this year. That he had been trained in its use, and that he also took a lively interest in general natural phenomena is shown by the fact, that during the winter, from October 10th, till the summer of 1790, he kept a careful meteorological journal, in which were noted the readings of the thermometer three or four times a day, the direction and force of the wind, and general remarks on the climate. During the same time he took a series of astronomical observations, six being meridian altitudes of the sun for latitude; and thirty-five lunar distances for longitude. The result of these observations as worked out by him, placed the House in Lat. 53° 56′ 44″, Long. 103° 13′, a position almost identical in latitude, and only about three to the east of the position given for Cumberland House in the latest Dominion Lands map.

On the ninth of June, 1790, he left Cumberland House, and descending the Saskatchewan, entered "Great Lake" (Lake Winnipeg) on June 15th, passing through which he entered Play Green Lake, and followed the Hudson's Bay Company's regular route through Trout River, Knee Lake, and Hayes River to York Factory where he arrived on July 7th. Throughout the whole of the distance from Cumberland House, he made a careful track-survey of his course, taking his bearings with a compass, and estimating the distances by the rate of travel, checking the survey by numerous observations for latitude and longitude, taken with the above-mentioned sextant and an artificial horizon.

Between July 1790 and September 1791 the note-books do not show any entries, so that his whereabouts during that time are uncertain, but from this latter date to April, 1792, he was at York Factory, as is shown by the record of a number of astronomical observations taken by him during this period.

The next entry is in September of the latter year, on the 5th of which month, at 8 a.m., he left York Factory with two canoes, and rounding the Point, entered the Nelson River, which he ascended, making as careful a survey as possible of the route, till he reached Seepaywisk House, on October 8th, which he places in Lat. 55° 3′, 15″, Long. 94° 41′ 30″. Here he remained till May 28th, 1793, trading with the Indians and keeping a careful meteorological register. On the above date he left Seepaywisk and crossed to Chatham House, on Chatham Lake, which house he places in Lat. 55° 23′ 40″, Long. 97° 45′ 34″. On May 31st, he left Chatham and travelled in a westerly direction to Burnt-wood River, up which he travelled to Burnt-wood Lake, then round to Missinippi River, which he ascended, intending to proceed to Reindeer Lake. He was, however, unable to find the Indians whom he expected to meet, and in Latitude, 55° 35′ 20″, Longitude, 102° 10′ 49″, he turned back and made his way down the Churchill and Nelson Rivers to York Factory, which he reached on July 21st. This is the only instance that I can find in his long career of travel and adventure where he set out with the intention of reaching a certain point and returned before he had accomplished his purpose, though, as will shortly appear, he performed the journey a few years afterwards. On September 1st, of this year, (1793) he started to ascend the Hay's River on his way to the Saskatchewan, the mouth of which he reached on September 22nd, and Cumberland House, on October the 5th. On October the 8th he left Cumberland House, and ascended the Saskatchewan to the Forks, when he turned up the South Branch, and after three days travel, reached South Branch House on October 18th. Here, he took horses and journeying overland reached Manchester House on October 18th, and Buckingham House on October 31st. Of these three places, the first was situated on the South Saskatchewan River, not far from Batoche's Crossing, while the other two were on the North Saskatchewan; Manchester House, being three-and-a-half miles below the mouth of Horse Creek, in Tp. 48, R. 21st, west of the 3rd Initial meridian and Buckingham House. four miles above the mouth of Moose Creek, about the line between Ranges five and six, west of the fourth Initial meridian. He afterwards rode out to the Beaver Hills and reached Buckingham House again on November 29th. There he remained till the following Spring, keeping, as usual, a meteorological register, taking observations for latitude and longitude, and working out his former traverses by latitude and departure when not engaged in trading with the Indians.

In the following Spring, on May 16th, 1794, he left Buckingham House for York Factory, making a survey of the Saskatchewan River on his way down. Besides Manchester House, he mentions two places named Hudson House, which he places respectively 3 and 14½ miles below the lower Crossing Place, the latter being 15 miles above Setting (Sturgeon) River. This would place them respectively in Ranges 3 and 2, west of the 3rd Initial meridian. On the 27th, he passed the mouth of the South Branch, which he calls Pekakemew, below which were several houses kept by Canadians, probably belonging to the North-West Company, namely: Isaac's House, 9¾ above Nepoïn House, kept by Messrs. Porter & McLeod; and Hungry Hall, by Messrs. Ross & Thorburn, 14 miles above the mouth of Sturgeon River. On reaching Cumberland House he did not again return to the Saskatchewan, but followed up and surveyed Sturgeon-Weir and Goose Rivers and Goose and Athpupuskow Lakes, from which he crossed Cranberry Portage into Cranberry Lake, and from this lake he went north-east, down Elbow River to Ithenoostosequan Lake, then south, down Grassy River, and then east to Reed Lake. Here he left Mr. Ross and proceeded on his journey by Crooked and File Rivers and Burnt-wood Lake to York Factory, where he arrived on July 5th.

On July 26th, he started on his return to Reed Lake, where he built a house in Lat. 54° 36′ 17″, Long. 100° 36′ 50″. There he remained, as shown by his meteorological journal, till May 28th, 1795.

In the Autumn of 1795, he built a house on the south side of the Duck Portage, in Lat. 55° 40′ 36″, Long. 102° 7′ 37″; and his meteorological register shows him to have remained there from September 6th to May 23rd, 1796.

Having gone from here to Fairford House on the Missinippi, one mile below the mouth of Deer River, in Lat. 55° 33′ 28″, he left this latter House on June 10th, 1796, and ascended Deer's River to Deer's Lake, thence into Hatchet Lake, and down the Black River to its mouth in Athabasca Lake, which he reached about July 2nd, and returning, he reached Fairford House on July 21st. With regard to the survey made during this journey, he states that the course was worked out from rough sketches which were saved when most of his notes were lost in a wreck on Black River. Returning to Deer Lake he built Bedford House in Lat. 57° 23′; Long. 102° 58′ 35″, and remained there till May 23rd, 1797, keeping his customary meteorological journal, and taking a long series of observations for latitude and longitude.

On Tuesday, May 23rd, 1797, he left the service of the Hudson's Bay Company and entered that of the North-West Company, the following entry being written in his journal of the above date. "This day left the service of the Hudson's Bay Co., and (entered) that of the Company of Merchants from Canada. May God Almighty prosper me." On the same date he left Bedford House, and on May 28th, arrived on foot at Alex. Fraser's house at the head of the Deer's River. On June 7th, he left this House and descending the Deer's River, proceeded as quickly as possible to Cumberland House, meeting on the way Messrs. McLeod, Roderick McKenzie and Simon Fraser, members of the North-West Company for which he was now working.

He reached Cumberland House on June 23rd, and left it on the 27th, reached Lake Winnipeg on the 28th, and travelling by way of Winnipeg River, he reached Lake Superior on July 22nd, having as usual, made a survey of his route.

Here, being thrown among new associates, he makes a note of the men composing the North-West Company, and having charge of the different districts. The following list includes the most of those named:

Wm. McGillivray and Alex. McKenzie, agents; Rod. McKenzie, Angus Shaw, and James Finlay for Montreal; Cuthbert Grant, back of Red River; Wm. Thorburn, Red River; Daniel McKenzie, Fort Des Prairies and Red Deer River; Wm. McKay, Muskeiko Country; Simon Fraser, Grand Portage; Sayer, Lake Superior.

Clerks; Donald McTavish, Beaver River; Alex. McKay, Isle a la Crosse; John McGillivray, Muskrat River Country; Duncan McGillivray, Upper Fort Augustus; John McDonald and J. Hughes, Fort George; Arch. Todd, Lower Fort Des Prairies; McGillis, Red Deer River; John McDonald and George McKay, Red River and back countries.

On August 9th he left the "Grand Portage," at the mouth of Pigeon River near Lake Superior, in company with Mr. McGillis, and descended through Rainy Lake and Lake of the Woods to Lake Winnipeg, which he reached on September 1st. Crossing this Lake and ascending the Litte Saskatchewan or Dauphin River, he reached Lake Manito (Manitoba) on September 10th. He crossed this lake and reached Lake Winnipegoosis by way of the Meadow Portage. On September 17th, being camped near the mouth of the Little Dauphin River, provisions were received from Fort Dauphin, on or near Dauphin Lake. They immediately started northward, and on the 19th, Mr. McGillis left to go up the Red Deer River, while he himself went on, and reached the mouth of "Swan"(Shoal) River. Ascending the Shoal River and passing through Swan Lake he ascended the Swan River for 4¾ miles, by the windings of the stream, to Swan River House.

Setting out from here on horseback in company with Mr. Grant, he ascended to Swan River valley and reached Belleau's House on Snake Creek on the following day. From here he turned south, and passing the H. B. Fort at the elbow of the Assiniboine, descended to Grant's House on the Assiniboine, near the mouth of Little Boggy Creek. Here he remained till Oct. 14th, when he returned to Belleau's House on Snake Creek, in order, if possible. to obtain guides to take him up the Swan River to the Red Deer River, and around to the head waters of the Assiniboine. From this date to November 28th his journal was lost, but he states, "I surveyed the Stone Indian (Assiniboine) River upward, and its sources, and the Red Deer River and its sources, and from thence returned to the house of Mr Cuthbert Grant, at the Brook's, on the Stone Indian River," or as before stated, near the mouth of Little Boggy Creek. He however worked out traverses by latitude and departure which show his course to have been from Belleau's House on the Assiniboine and thence to where he arrived on November 4th From here he travelled down the bank of the valley to Grant's House, then to Thorburn's House on Calling River, and on to McDonald's House near the mouth of the Souris River, after which he made a short traverse of the Assiniboine, above McDonald's House. He also incorporates a survey made by Mr. McGillis from the Upper to the Lower Settlement on the Red Deer River, giving at the same time the latitudes and longitudes of all the above places as obtained by observation.

On November 28th, he left McDonald's House on his way to the Mandan villages on the Missouri River. On Dec. 7th, he reached old Ash House on the Souris River, "settled two years ago and abandoned the following Spring." Having been unable to procure a guide here, he himself assumed the lead, and struck across to Turtle Mountain, beyond which he again crossed to the Souris or Mouse River, which he followed up to its "bight" whence he crossed the plains, a distance 37 miles to the Missouri River, reaching it on Dec. 29th at a point six miles above the upper of the Mandan villages. These villages are stated to have been five in number, and contained in all 318 houses and 7 tents, inhabited by Mandan and Willow Indians in about equal numbers; and the number of Willow Indians in another place in his notes (there called Fall Indians) is placed at 2,200—2,500. He remained at these villages till January 10th, trying to induce the Indians to come north to trade, but with very little success, as they were afraid of the Sioux. While here he wrote down a vocabulary of the Mandan language, containing about 375 words.

On January 10th, 1798, he left the villages, but being delayed by severe storms, it was the 24th before he reached the Souris River, and February 3rd when he arrived at McDonald's House at the mouth of Souris River.

There he remained till Feb. 25th, plotting his work and preparing for a long trip on foot to connect the waters of the Red River and the Mississippi, and thence over to Lake Superior, a trip which his companions ridiculed as being impossible to accomplish before the advent of summer. On Feb. 25th, however, he started out on foot with a dog team, and descended the Assiniboine to its mouth, making as he always did, a survey of his route; passing on his way Pine Fort and Popular House both of which had been abandoned, and some houses a little below the portage to Lake Manitoba. On March 7th he reached the mouth of the Assiniboine, and, walking on the ice, turned up Red River: and on the 9th reached Rat Brook, ½ mile up which was the N. W. Coy's House of Mr. Chaboillez. On March 14th, he reached the house of Mr. Charles Chaboillez, at the mouth of the Summerbury or Pembina River, in Lat. 48° 58′ 29″, where he stayed till March 21st. He then continued up the Red River past a N. W. Coy's House, kept by M. Roi, and turning into Red Lake River, ascended it to the mouth of Clear River where there was a N. W. Coy's Post, kept by Baptiste Cadotte. After trying for several days to proceed further on foot, he was obliged to return to this place and wait for the breaking up of the ice. He places this Post in Lat 47° 54′ 21″, Long 97° 45′. On 9th April he started up the Clear River with three men in a canoe, on the 11th passed the mouth of Wild Rice River; on the 15th, carried across to the Red Lake River, and reached Red Lake the 17th, at a point which he places in Lat. 47° 58′ 15″, Long. 96° 30′. From here he turned southward, and after carrying over several portages and through small brooks and lakes he reached Turtle Lake on April 27th, from which flows "Turtle Brook" which he states to be the source of the Mississippi, since it is from here that the river takes the most direct course to the sea. Thus to this indefatigable but hitherto almost unknown geographer belongs the honor of discovering the head waters of this great river, about whose source there has been almost as much discussion as about those of the Nile itself. His course is well laid down on his "Map of the North-West Territory of the Province of Canada, made for the North-West Company in 1813-1814;" on a scale of about 15 miles to an inch, and now in the possession of the Government of the Province of Ontario.

An excellent account of the early expeditions to the head waters of the Mississippi is given by Mr. N. H. Winchell, in his Historical Introduction in the Final Report on the "Geology of Minnesota," 1884. In giving an account of Lieut. Pike's journey to Red Cedar (Cass) Lake 1806, he there states that "Mr. Thompson's maps and papers never having been published, Lieut. Pike is to be accredited with the first authenticated examination of the Mississippi valley from the St. Francis River to Red Cedar Lake." The first who is stated to have travelled through the country north of Red Cedar Lake was J. C. Beltrami, an Italian gentleman, who accompanied Major Long's expedition as far as Pembina. He ascended Bloody (Red Lake) River to Red Lake and from thence followed Thompson's route to Turtle Lake whence he descended the Mississippi to its mouth. This was in the summer of 1823, nine years after Thompson had recorded his discoveries on the above mentioned map, and twenty-five years after he had made the survey of his course.

In a note at the end of this Historical Introduction however, it is stated that Neil in the 4th edition of his History of Minnesota gives a short account of Thompson's journey across the State in A.D. 1798, which appears to be approximately correct. I have not been able to see a copy of this edition of Neil's History and cannot speak further of it.

From Turtle Lake, Thompson descended Turtle Brook to Red Cedar (Cass) Lake, on which there a N. W. Coy's House kept by Mr. John Sayer, which he places in Lat. 47° 27' 56″; Long. 95°. Remaining here from April 29th to May 3rd, he again embarked and struck across to the head of the Mississippi River, down which he travelled through "Winnipegoos" Lake to the mouth of Sand Lake River, where he left the main stream and turned up Sand Lake River to Sand Lake, on which was a House of the N. W. Co., S 14° E. 1¼ mile from the head of the river, and in Lat. 46° 46′ 39″.

From this House he crossed the Lake to the mouth of Savannah Brook, which he followed up to Savannah Carrying Place, a deep bog four miles across. Crossing this portage to a small creek that flows into the St. Louis River, he descended the latter stream to Fond du Lac House, two miles and a half up the river from Lake Superior. He reached this Post on May 10th, 2 months and 18 days after leaving the mouth of Souris River.

From here he surveyed the south shore of Lake Superior, arriving at the Falls of Ste. Marie on May 28th. Leaving here in a light canoe with 11 men, he reached the Grand Portage on June 7th, and remained there till July 14th. The time was a very busy one at this, the central Post of the Company; and he gives a very interesting account of the men who were almost daily arriving from and departing for many widely separated points throughout the west.

On July 14th he started for the interior reaching the Fort at the mouth of the Winnipeg River on July 31st, and on August 9th, the mouth of Saskatchewan, having travelled along the eastern shore of Lake Winnipeg. On the 18th of August he reached Cumberland House, where he states that Mr. Peter Fidler was stopping at the time. This gentleman was in the service of the Hudson's Bay Company and travelled and made extensive surveys throughout the North-West. His journal has been stated to be still in existence, and if made public, might be almost as absorbingly interesting as that of David Thompson himself. On August 19th he again set out, his destination being Lac la Biche or "Red Deer Lake." Ascending the Sturgeon-Weir River and passing through Beaver Lake he reached the Missinippi by way of the Trade Portage, on August 24th. He ascended the Missinippi to Lac la Ronge, on which he mentions an old House where Simon Fraser and Versailles wintered in 1795-96. He crossed the Lake and came to a House kept by Versailles at the mouth of Rapid River, 1¼ mile beyond which is an English House. From here, ascending to Isle a la Crosse Lake, he reached the N. W. Coy's House on September 6th. Thence, travelling south, up Beaver River as far as the mouth of Green River, he ascended this latter stream to Green Lake, on which was a Post which he places in Lat, 54° 17′ 9″, Long. 107° 40″ 35′. There he took horses and travelled westward to Fort George on the Saskatchewan, a short distance above the mouth of Moose Creek and close to the Hudson's Bay Company's Fort, Buckingham House. From here he again turned northward and reached the Beaver River at the mouth of Mouse Lake Creek, from which point he ascended the Beaver River, and crossing the water-shed reached "Red Deer Lake" or Lac la Biche on October 4th. Here he built a House in Lat. 54° 56′ 30″, Long. 112° 12′, and remained through the winter trading with the Indians. His journal states that he was here on March 14th, 1779; but on April 4th he was at Fort Augustus on the north Saskatchewan, and remained there till April 19th. On this date he set out with 3 men and 5 horses, and travelling northwest-ward, reached the Pembina River. Here a canoe had been built for him, so that, sending back the horse he started down the river and reached the Athabasca on April 25th, down which he paddled to the mouth of Lesser Slave Lake River. He turned into this stream and surveyed it up to the lake, and then returning he continued down the Athabasca River to the Fort at the mouth of the Clearwater, where he remained for a few days. On May 10th, however, he again set out and ascending the "Methy Portage" (Clearwater) River, crossed the Portage, and descending through Buffalo Lake, reached Isle a la Crosse on May 20th.

Here he was married on June 10th, to Charlotte Small, a young girl who had not yet entered on her fifteenth year.

From Sept. 11th to the 28th he was at Fort George, and on March

25th of the following year, 1800, he started from this fort overland to Fort Augustus, travelling along the north side of the "Chain of Lakes." After staying here for a few days he set out on March 31st for RockyMountain House, travelling to the east of Bears Hills, across two branches of Battle River, down the Wolf's trail and across Wolf Creek (Blind Man River), to a crossing of Clearwater River two miles above its mouth, arriving at Rocky Mountain House on April 7th. The old House of the North-West Company was situated on the north bank of the Saskatchewan, a mile-and-a-quarter above the mouth of Clearwater River. From here he had intended to cross over to the Red Deer River and descend it in a boat, but having been lamed in some way, he sent four men, Chauvette, La Gasse, Clement and Jacco Cardinal on this journey. As he records the fact that they started from Rocky Mountain House and that a boat had been built for them beforehand, and as some of them at all events are afterwards mentioned in his journal, it seems probable that these men sucessfully descended the Red Deer and South Saskatchewan Rivers, being in all probability the first white men to accomplish this journey. He himself descended the North Saskatchewan. Five miles below the Elbow, where there are very high banks he "found the English encamped for building" at the mouth of a creek flowing in from the right which he calls Sturgeon Creek (Buck Lake Creek), and passing White Mud House, a fort of the North-West Company with Mr. Hughes in charge, he reached Fort Augustus on May 9th, and on May 12th arrived at Fort George. On May 18th he left Fort George and on May 21st passed the Island House, a mile-and-a-half above the mouth of Birch Brook, and the next day passed Turtle River House, a mile-and-a-half below the mouth of Turtle Brook. On June 7th he reached the mouth of the Saskatchewan.

From this time till the Autumn nothing is seen of him, but he evidently returned up the Saskatchewan to Rocky Mountain House, as on October 5th he set out from this place on horseback with five men and three pack-horses, up the Clearwater River and over to the Red Deer River, which he ascended till he reached the mouth of William's Creek. a small brook in Lat 51° 41′ 41″, Long 114° 56′ 40″. There he pitched his camp for several days, and during the time he states that he rode 22 miles due west to the foot of the abrupt cliffs of the Rocky Mountains where some Kootanie Indians were camped.

Inducing them to return with him to the fort, he again reached Rocky Mountain House on October 19th.

There he remained till November 17th, when accompanied by Duncan McGillivray, and attended by four men, he set out from the above fort, and travelling on horseback southward along the trail up Clearwater River, he crossed Red Deer River and reached Bow River at a point opposite to where the town of Calgarry now stands in Lat. 51° 2′ 56″, Long. 113° 59′. From here he followed the north-east side of the river to a short distance below the bend, where he crossed it and went on to the Spitchee or Highwood River, which he reached two miles above its mouth. From here he turned a little west of south, and reached a camp of the Pikenows or Peikans in Lat. 50° 35′ 30″; probably on Tongue Flag Creek. After stopping here for a short time in order to establish friendly relations with the Indians, he turned northwestward and again reached Bow River at a point which he places in Lat. 51° 13′ 57″, Long. 114° 48′ 22″, apparently a short distance above the mouth of Ghost River. From here he ascended the south side of the Bow River to the Gap, which he places in Lat. 51° 3′ 4″, Long. 115° 21′. From here he returned to his old camp on the Bow River, and crossing the stream, struck northward to Rocky Mountain House, which he reached on December 3rd.

During the same year Duncan McGillivray is stated to have made a traverse westward from Rocky Mountain House, up the north side of the North Saskatchewan to the small lake at its head three miles beyond which he crossed the centre range of the Rocky Mountains, beyond which he travelled four miles down a stream flowing towards the south-west, from which point he returned to Rocky Mountain House. His traverse is carefully laid down in Thompson's note book.

During the winter of 1800-1801 Thompson remained at Rocky Mountain House trading with the Indians, working out old observations and taking new ones, though the last record that I can find for the winter is dated March 18th.

In June he made a "journey into the Rocky Mountains by land," which is found in his note books worked out by latitude and departure. Starting from a point on the Saskatchewan River in Lat. 52° 27′ 39″, Long. 115° 30′ 50″, he travelled at first a little south of west, and then a little west of south, to a point in Lat. 51° 57′ 21″, Long. 116° 27′ 54″, from which point he returned to the fort.

Between August 30th and September 2nd he travelled on horseback from Rocky Mountain House to Fort Augustus passing by the south end of Long (Gull) Lake.

He is now lost sight of for a considerable time, and it is not till November, 1802, that we find him travelling from the head of Lesser Slave River to the Fort on the west end of Lesser Slave Lake, which he places in Lat. 55° 32′ 36″. By the beginning of the following year he has reached the Fort on the Peace River, five miles above the mouth of Smoky River, which he places in Lat. 56° 8′ 17″, Long. 117° 13′ 14″,with a variation for the compass of 23½° east.

From January 18th to June 5th he kept a meteorological journal at this Post, jotting down at the same time many interesting notes, one being that he had measured the river opposite the fort and had found it to be 420 yards and 2 feet wide. On the latter date he states that a canoe of the X. Y. Company arrived and put up 100 yards above them where they are going to build.

From June 5th to 24th he was hunting, &c., in the vicinity, and from June 25th to December 11th the meteorological journal is kept regularly. Between the latter date and Dec. 29th he made a trip with dogs to Lesser Slave Lake and back. From this latter date to February 28th 1804, he continued his meteorological journal. In it are many notices of the X.Y. men.

On February 29th he started on foot with dogs and ascending on the river reached Rocky Mountain House on March 6th. This house he places in Lat. 56° 12′ 54″, Long. 120° 38′ with a variation of the compass of 25° east. On March 13th he again arrived at the Forks, and on the 15th started down the river on the ice and reached Horse Shoe House on the 20th. This House he placed in Lat. 57° 8′, Long. 11° 39′ 49″, with variation 24° east.

On April 30th the ice had broken and he left Horse Shoe House in a canoe, passing Fort Vermilion on May 2nd, and descended the river to Lake Athabasca, on which Athabasca House was situated in Lat. 58° 42′ 50″, Long 111° 8′ 30″. He arrived here on May 12th, and leaving it on 15th, embarked for Isle a la Crosse, keeping a survey in the Forks of the Athabasca River, where he arrived on May 19th. From Isle a la Crosse he proceeded directly to Kaministiquia, afterward known as Fort William, to which place the North-West Company had lately removed its headquarters from Grand Portage. On July 25th he again left Kaministiquia and proceeding now through Lac Mille Lacs and Lac la Croix instead of down the St. Francis and Rainy Rivers, he reached the mouth of the Saskatchewan River on September 1st and Cumberland House on September 8th. From here, on September 10th, he proceeded through Sturgeon Goose and Athapupuskow Lakes to Cranberry Portage. At the narrows in Cranberry Lake he left men to build a house. He himself went on through Reed Lake, up the Little Swan River, and through Burntwood Lake, reaching the Missinippi on September 30th, down which he travelled for a short distance to an old fort, which was reached on 1st. After provisioning a house here he set off down the river and arrived at Musquawegan on October 6th in Lat. 56° 13′ 7″, Long. 100° 25′ 50″, Var. 12° 30′ east. He remained here till the following spring, and his journal during the winter is filled with remarks about the X. Y. and H. B. Companies and the fur trade generally.

On May 27th and 28th, 1805, he made a journey to the post on Indian Lake, in Churchill River, which he places in Lat. 56° 48′ 20″. On June 1st he left Musquawegan and ascended to the forks of the Missinippi, and from there, by Burnt-wood Portage, &c., to Cumberland House, where he arrived on June 17th. Here he heard that the N.W. and X.Y. Companies had united. Leaving Cumberland House on June 23rd he returned to the fort on Cranberry Lake, where he stayed till July 25th. On this date he set out for Deer Lake. He carried across Cranberry Portage, paddled through Arthapupuskow and Goose Lakes, up the Sturgeon-weir River to Beaver Lake, and on to Trade (Frog) Portage, then down the Missinippi and up the Deer River to Deer Lake, where he arrived on August 4th. Leaving Mr. Frobisher at the lake to build a house, he returned to Cumberland, where he arrived on August 24th. He remained here till September 10th, on which date he set off to Rat River by Cranberry Portage, arriving at his destination on September 19th. Here he built a house and remained during the winter up till June 10th, 1806. On this date he set out for Cumberland, where he arrived on June 14th. He immediately proceeded eastward to Kaministiquia. There is now a break in his journal till October 10th, but Harmon states he met him at Cumberland House on September 11th on his way west from the New Fort (Kaministiquia) to Fort des Praries. This latter appears to have been a general name used for the principal fort for the time being on the North Saskatchewan. On October 11th he is just arriving at Rocky Mountain House, where he remained trading with the Indians throughout the following winter.

On May 10th, 1807, he set off on horseback for the Rocky Mountains, along the north side of the Saskatchewan, while Mr. Finnan McDonald took a canoe with provisions up the River. On June 3rd they reached the Kootanie Plain, a wide, open flat on the north side of the river within the mountains, which he places in Latitude 52° 2′ 6″, and on June 6th they reached the Forks. They turned up the south branch of the stream, but, after ascending it for three miles, were obliged to stop as they could take the canoe no further. They remained here till June 25th, when packing everything that they wished to take with them on the backs of their horses they started to cross the mountains. At one o'clock on the above day they reached the height of land in Lat. 51° 48′ 27″, from which point they descended along the banks of a mountain torrent to "Kootanie" (Columbia) River, which they reached on June 30th in Lat. 51° 25′ 14″, Long. 1168 52′ 45″, having thus come through the mountain by what is now known as the Howse Pass down the Blaeberry River; a pass that was afterwards examined by Dr. Hector in 1859, and described by him in Palliser's Report to the British Government. This pass was not used by Howse till 1810, three years after Thompson made his first trip over it. He remained at his camp near the mouth of the Blaeberry till July 12th, repacking the stuff and building canoes. On this date, having placed all the trading goods in canoes, he set out and ascended the river, reaching the Lower Columbia Lake on July 18th. At the north end of this lake he began to build in Lat. 50° 31′ 24″; but finding the place unsuitable, on July 29 he moved down the river to about a mile from the lake, and built Fort Kootanie on the west side of the Columbia River, in Lat. 50° 32′ 15″, Long. 115° 51′ 40″ Var. 24½° E. There is now a village of Shuswap Indians about opposite to where the old fort used to stand.

He remained at this for the rest of the year, and till April 20th, 1808, trading with Kootanie Indians, and, as usual, taking meteorological and astronomical observations. He also carefully measured the heights of some of the neighboring mountains, from a measured base of 6,920 ft. Mt. Nelson, to the west of the fort, he found to be 7,223 ft. above the surface of the lake, which would give it a height of 9,900 ft. above the sea; a height 100 ft. lower than that given on Dr. Dawson's map of 1885. On April 20th, 1808, he set out with canoes towards the south, and the next day reached the portage to the "Flat Bow" or "McGillivray's" (Kootanie) River, which he calls McGillivray's Portage. From here he descended the "Flat Bow" (Kootanie) River in a canoe, making a careful survey with a compass, by latitudes. On April 24th, he passed the mouth of the "Torrent" (St. Mary's) River, and on the 27th reached the mouth of the "Fine Meadow" (Tobacco) River. On May 6th, he reached the Falls and portaged past them, and on the 8th reached a camp of Flatheads Kootanies in Lat. 48° 42′ 52″, Long. 116°. Having induced these Indians to promise to trade with him, he again set off on the 13th, and on the next day reached Flat Bow or Kootanie Lake. From here he returned up the river to the camp of the Flatheads, whence he took horses and travelled in a north-easterly direction up "McDonald's" (Moyie, or Choecoos, or Grand Quête River; and on May 18th reached McGillivray's (Kootanie) River, which he crossed and following up the Bank of this stream across Skirmish and Lussier Rivers, the latter called after one of his men, reached the Fort on June 5th. From here he continued northward down the Columbia to the mouth of Blaeberry River, from which place he crossed the mountains with the furs obtained during the year, reaching the height of land on June 21st, and Kootanie Plain on June 22nd. On this journey they were obliged to kill and eat several of his horses, as he was unable to obtain other provisions.

At Kootanie Plain he embarked in a canoe and descended the Saskatchewan, passing Rocky Mountain House on 24th; Muskako Fort on the 26th, four and a-half hours after passing Wolf Brook; and reaching Fort George on June 30th, having passed "Old Island Fort" three hours and a half before. Next day he descended to Fort Vermilion, to which place the head-quarters of the district had been removed from Fort George. This fort is stated by Alexander Henry to have been situated in Lat. 53° 51′ 7″, on the north side of the

Saskatchewan River, "in a long flat bottom of meadow directly opposite the Vermilion River." On July 3rd he again embarked, and on the following day passed "burnt Fort de L'Isle." On July 6th he reached the Crossing Place (at or close to Fort Carlton) at 2 p.m., Fort de Milieu at 4.30 p.m., old Hudson House at 6.30 p.m. On July 7th he reached the Forks at 2 p.m., Fort St. Louis at 5 30. p.m., and Fort la Corne at 6.15 p.m. On July 9th he arrived at Cumberland House, and on August 2nd Rainy Lake House. On August 4th he again set out for the west reaching Cumberland House on the 26th, Fort Vermilion on September 14th, and Fort Augustus, on the 23rd. On October 1st he passed old Muskako fort and on October 3rd arrived at Boggy Hall, in Lat. 53° 1′ 19″. This fort according to Alexander Henry was abandoned in the fall of this year. Writing in 1811 he says:—"The remains of the buildings stand upon a small plain on the north side of the river, about half a mile from the river, through thick woods. The situation of the house is very pleasant, having a beautiful meadow on one side, sufficiently large for a horse-race, the whole is bound in by tall poplars aspen and pine." Here, sending on the canoes he took men and horses, and on October 9th passed old Rocky Mountain Fort, and travelled till 17th, when sharp frosts setting in the canoes could be brought no further. Having therefore camped for a few days to arrange the packs, he set out with pack-horses on October 22nd, passed the Kootanie Plain on the 24th, and on the 27th crossed the height of land.

Here he killed two buffaloes, and he states that there was a herd of cows still ahead of them; being, therefore, some distance down on the western side of the water-shed. On Oct. 31st, he again reached the Columbia River. From here he sent the horses southward through the woods, while he ascended the river in a boat as far as a hoard that had been built beside the river the year before, in Lat. 50° 53′ 34″, which must be not far from the mouth of the Spilimichene River.

In this course he speaks of the "Rapid" (Kicking Horse) River. From here he sent Mr. Finnan McDonald southward with the canoes, who established a fort and wintered near the falls on Kootanie River, while he himself went on horseback to the old Kootanie Fort where he arrived on November 10th. He remained here during the winter trading with the Kootanie Indians.

On April 17th, 1809, he removed a short distance down the river and camped till the 27th. He then descended the Columbia River in a canoe, the horses being at the same time driven through the woods to the Mountain Portage, and crossed the Mountains to the Saskatchewan, reaching Kootanie Plain on June 13th. During the winter he had obtained in all, about 40 packs of furs. At the Kootanie Plain a canoe was built and some of the furs being put into it he started down the river reaching Fort Augustus on June 24th. On the 27th two canoes were sent eastward with his furs, but he himself remained at the fort till July 18th. On this date having sent the canoes up the Saskatchewan a day or two before him, he set off on horseback towards the mountains and caught up to and joined the canoes near the mouth of Wolf Creek, sending the horses back as they had come. Travelling up the river he reached Kootanie Plain on August 3rd. Here he remained till the 8th, arranging the packs for the journey across the mountains, and on this date he started westward on horseback. Next day he met Mr. Howse, an officer of the North-West Company, who had left Fort Augustus a short time before on an exploring trip, returning again to the east. On the 11th he crossed the height of Land, and on the 13th reached the "Kootanie" (Columbia) River. Ascending this river he reached McGillivray's portage on the 20th and started down the Kootanie River, and on the 29th reached the Great Road of the Flatheads, where he had come to the large camp of these Indians in the spring of 1808. On September 6th, having obtained horses from the Indians he set out towards the south and reached Pend d' Oreille Lake on the 8th, and next day the mouth of Clark's Fork, where it empties into the lake, near which there was a large camp of Indians. On the 10th he found a spot on a peninsula on the east side of the lake in Lat. 48° 12′ 14″, where he built a house. He himself remained here for about two weeks to see that building operations were being pushed on as quickly as possible. On the 27th he rode around the south side of the lake and a short distance down the river flowing from it, returning to the house on October 6th. On the 11th he again set off on horse-back, and travelled for a considerable distance in a south-easterly direction up the Seleesh River or Clark's Fork. Turning from this river he travelled first north-east and then north-west, till he reached the Kootanie River above the Falls, where having obtained canoes he descended to the Flat Head Road and crossed to the House on Pend d' Oreille Lake which he reached on October 30th.

On November 2nd he again set off up the river, and on November 9th reached a point where he built a house in Lat. 47° 34′ 35″, Long. 115° 22′ 51″. He remained at this point till February 23rd, on which date he left it to travel among the Indians, returning on March 6th. Setting off again immediately he journeyed on horse-back till March 13th, when being a considerable distance up the Saleesh River he embarked in a canoe and came down to the House, which he reached on the following day, making, as usual, as careful a survey as possible of his route. He then remained here till March 24th, when he again started down the river and the next day reached the "House Road," where he remained till April 19th, when he embarked and reached the House on Pend d'Oreille Lake on April 23rd. From here he crossed to the Kootanie R ver, ascending which he reached McGillivray's Portage on June 6th, and descending the Columbia reached the Mountain Portage on June 16th. From here he crossed to the Saskatchewan arriving at the Forks in the mountains, on the 19th, having left the men to come after with the pack-horses.

Embarking in a canoe from here he soon passed the ruins of Fort Augustus, which, since he left it in the previous July, had been destroyed by the Blackfeet, and on the next day reached White Mud Brook House, where Mr. Henry was in charge for the N. W. Co. and Mr. Hellet for the H.B. Co. This house appears to have been at the mouth of White Earth River, a short distance below the present site of Victoria. On July 4th he reached Cumberland House, and on July 22nd Rainy Lake House.

From this date to May 6th, 1812, no journal could be found in the offices of the Crown Lands Department of Ontario, but a long series of astronomical observations is given from which his course has been traced out as follows :—

Having returned from the east he was at the site of Boggy Hall on the Saskatchewan on Octcber 23rd of this year (1810). From here he took a north-westerly course across the country, being on November 2nd in Lat. 53° 8′ 3″, Long. 115° 3′ ; on November 13th, in Lat. 53° 16′ 36″, and on November 21st in Lat. 53° 24′ 42″, Long. 116° 50′. On November 26th he left McLeod River, in Lat. 53° 30′ 39″. and on November 28th was at a Brook in Lat. 53° 37′ 54″. On December 1st he reached Athabasca River, and on the 5th and 6th was at the depot in Lat. 53° 33′ 33″, Long. 117° 30′. From here he ascended the Athabasca River, and crossing the mountains by the Athabasca Pass reached the Columbia at the mouth of the Canoe River, where he spent the remainder of the winter, and where the N.W. Co. had a Post, perhaps built by himself after his arrival. From here, in the spring 1811, he ascended the Columbia River to its source, crossed McGillivray Portage, and, descending the Kootanie River, was at the "Great Kootanie Road" on May 19th, which road strikes up a stream from the south-east bend of the Kootanie River. He crossed on this road, or on the "Lake Indian Road," north of the Pend d'Oreille Lake to the Saleesh (Clark's Fort) River, and then on the "Sheetshoa Road," which runs north-west from Saleesh River, about ten miles below Pend d'Oreille Lake, to the "Sheetshoa" (Spokane) River, and on June 15th he was at Spokane House on this river, which house he places in Lat. 47° 47′ 4″. He then descended the Spokane River to the Columbia and ascended the Columbia to "Ilthkoyape" or Kettle Falls, near the present site of Colville, which he places in Lat. 48° 37′ 30″., Long. 117° 55′. Here he remained for a few days, and then descended the Columbia to its mouth, where he arrived on July 15th or 16th. Alexander Ross and Gabriel Franchère state that it was on the 15th, but Thompson's record of his observations seems rather to point to the 16th as the date of his arrival. The "Pacific Fur Company," under which the two gentlemen above named were clerks, had in the spring of this same year founded a fort at the mouth of the Columbia which they named Astoria, a name that was afterwards changed to Fort George, when it was sold to the North-West Company in the autumn of 1813.

After spending a few days with Mr. McDougall, the hospitable commander of Astoria, Thompson started back up the Columbia and on July 24th was camped in the mouth of the Willamette River, near the site of the present town of Portland. From here he continued his ascent of the Columbia (several observations being given) to the mouth of "Shaupatin" (Lewis or Snake) River, which he ascended to

Lat. 46° 36′ 13″, Long. 118° 50′, where he was on Aug. 8th and 9th. Here he says, "we laid up our canoes," and he must then have crossed by land to Spokane House, where he was from Aug, 12th to 15th. The trail that he probably took was not far from the present line of the Northern Pacific Railway. From Spokane House he followed the Spokane River to its mouth, after which he ascended the Columbia to Boat Encampment, at the mouth of the Canoe River, and thus completed the survey of the stream from its source to its mouth. On October 4th he was at "Mr. Wm. Henry's Campment," at the headwaters of the Athabasca River in Lat. 52° 53′, Long. 118° 35′.

From this date till the beginning of the following May all that we know of his whereabouts from his notes is that he records two observations for longitude at Ilthkoyape Falls on April 21st, 1812, so that it appears not impossible that he wintered either at that or at Spokane House.

On the 6th of May of this year he set out on foot from Boat Encampment on the Columbia River, and travelling eastward by the Athabasca Pass crossed the height of land on May 8th, and on the 11th reached the house of Mr. Wm. Henry on the Athabasca River, in Lat. 52° 55′ 16″. On the 13th he started down the river from here in a canoe, making his last survey in the North West Territories. On the 20th he reached the mouth of Lesser Slave River, up which he pushed to the house at its head. Descending the river again he left its mouth on May 24th, and on the following day reached the Red Deer or La Biche River,, which he ascended, reaching Red Deer Lake or Lac la Biche on May 27th. Crossing the portage from this lake he descended the Beaver River at least as far as Lat. 54° 22′ 14″, Long. 110° 17′, where the survey that we have been following is broken off. It is not certain by what course he travelled to Cumberland House, but below this he doubtless followed on the ordinary trade route to Lake Superior. On August 12th he left Fort William and resurveyed the northern shore of Lake Superior to Sault Ste. Marie where he arrived on the 24th of the same month. Before October 20th he had arrived at Terrebonne, in Lower Canada, where he took up his residence, and the two following years were spent in preparing a map of Western Canada for the North West Company, on a scale of about fifteen miles to an inch, from the observations and surveys that he had made during the previous twenty years. This map, which is in possession of the Crown Lands Department of the Province of Ontario is entitled "Map of the North West Territory of the Province of Canada, 1792-1812, embracing region between Latitudes 45° and 56°, and Longitudes 84° and 124°;" "Map made for the North West Company in 1813-1814."

And now our notice must be drawn to a close as quickly as possible, as the object of this paper is to trace Mr. Thompson in his travels through the North-west rather than to write a sketch of his life, though such a sketch would undoubtedly be of absorbing interest.

From 1816 to 1826 he was engaged in surveying and defining the Boundary Line, on the part of Great Britian, between Canada and the United States, being employed in 1817 in the St. Lawrence, and having proceeded westward around the shores of the great lakes, he reached the Lake of the Woods in 1825. In 1834 he surveyed Lake Francis. In 1837 he made a survey of the canoe route from Lake Huron to the Ottawa River and a few years later he made a survey of Lake St. Peter.

His last years were spent either in Glengarry County, Ontario, or in Longueil, opposite Montreal, where he died on the 10th of February, 1857, at the ripe old age of nearly 87 years. His wife survived him by only about three months, dying on the 7th of May of the same year, and they are both buried in the Mount Royal Cemetery in Montreal.

He died in extreme poverty, and it was due to the kindness of some of his old friends that he received a Christian burial.

H. H. Bancroft, who has collected very many interesting details about the old travelers and traders in the west, but to whom the labors of this remarkable man have, up to the present, remained almost entirely a mystery, gives the following account of his personal appearance; "David Thompson was an entirely different order of man from the orthodox fur-trader. Tall and fine looking, of sandy complexion, with large features, deep-set, studious eyes, high forehead and broad shoulders, the intellectual was well set upon the physical. His deeds have never been trumpeted as those of some of the others, but in the westward exploration of the North West-Company no man performed more valuable service, or estimated his achievements more modestly.'

LIST OF FORTS AND TRADING POSTS, THE POSITIONS OF WHICH ARE GIVEN BY DAVID THOMPSON IN HIS FIELD NOTE-BOOKS

BELONGING TO THE HUDSON'S BAY COMPANY.

York Factory, on Hudson's Bay, in Lat. 57° 1′ 26″, Long. 92° 29′ 20″.

Seepaywisk House, on Seepaywisk Lake, in Lat. 55° 3′ 15″. Long. 97° 41′ 30″, Var. of Compass (1792) 12° 30′ east.

Chatham House, on Chatham (Wintering) Lake, in Lat. 55° 23′ 40″, Long. 97° 44′ 34″.

Reed Lake House, on Reed Lake. in Lat. 54° 36′ 17″, Long. 100° 36′ 50″, Var (1795) 10¾° east.

Duck Portage House, on the south side of Duck Portage, in Lat. 55° 40′ 36″, Long 102° 7′ 37″. Var. (1796) 15° east.

Fairford House, on the Missinippi, one mile below the mouth of Deer River, Lat. 55° 33′ 28″, Long. 103° 10′.

Bedford House, on the west side of Deer Lake, in Lat. 57° 23′, Long. 102° 58′ 35″.

Cumberland House, on the south side of Pine Island Lake, in Lat. 53° 56′ 44″, Long 102° 13′ Var. (1790) 11° 30′ east.

South Branch House, on the South Saskatchewan River, (probably near Batoche).

Lower Crossing of the North Saskatchewan River, Lat. 52° 57′ 48″, Long. 106° 30′ 30″.

Upper Hudson's House, on the North Saskatchewan, 3 miles below the Lower Crossing, (in Sec. 32, Tp. 46, R. 3, west of the 3rd Initial Meridian).

Lower Hudson's House, on the same river, 11½ miles below the last named place.

Manchester House, on the same river, 3½ miles below the mouth of Horse Creek, and 25 miles above the mouth of Turtle River.

Buckingham House, on the same river, about 4 miles above Moose Creek, in Lat. 53° 52′ 7″, Long. 110° 41′ 7″, Var. (1794) 18° east.

White Mud Brook House, close to the N.W. Co's post of the same name on the North Saskatchewan river.

Swan River House, on Swan River, near the N. W. Co.'s house of the same name, Lat. 52° 23′ 40″, Long 100° 36′ 53″.

BELONGING TO THE NORTH-WEST COMPANY.

West of the Rocky Mountains.

Kootanie Fort on the west bank of the Columbia River, 1 mile below the Lower Columbia Lake, in Lat. 50° 32′ 15″, Long. 115° 51′ 40″, Var. (1807) 24½° east.

"Hoard," on the River in Lat. 50° 53′ 34″.

Kullyspel House on the east side of Kullyspell or Pend d' Oreille Lake in Lat. 48° 12′ 14″.

Saleesh House on the Saleesh River or Clark's Forks in Lat. 47° 34′ 35″, Long. 115° 22′ 51″.

Boat encampment near the mouth of Canoe River on the Columbia, in Lat. 52° 8′ 1″, Long. 118° 18′ 18″.

Spôkane House on the Spokane River, in Lat. 47° 47′ 4″, Long. 117° 27″.

Ilthkoyape Falls on the Columbia River in Lat. 48° 37′ 30″; Long. 117° 56′.

East of the Rocky Mountains.

Rocky Mountain House on Peace River in Lat. 56° 12′ 54″, Long. 120° 38′ Var. (1804) 25° east:

Fort on Peace River 5 miles above the mouth of Smoky River in Lat. 56° 8′ 18″, Long. 117° 13′ 14″, Var. (1803) 23½° east.

Horse Shoe House on Peace River in Lat. 57° 8′, Long. 117° 39′ 49″, Var. (1804) 24° east.

Vermilion Fort on Peace River below Horse Shoe House.

Athabasca House on Athabasca Lake in Lat. 58° 42′ 50″, Long. 151° 8′ 30″.

Old Athabasca House (by Mr. Turner) Lat 58° 38′, Long. 110° 26½.

Wm. Henry's campment at the head waters of the Athabasca River in Lat. 52° 53′ 24″.

Henry's House on the same river in Lat. 52° 55′ 16″.

Depot on Athabasca River in Lat 53° 33′ 33″, Long. 117° 30″.

Lesser Slave Lake House at west end of Lesser Slave Lake in 55° 32′ 36″.

Fort "on the west point" on Athabasca River at the mouth of the Clearwater in Lat. 56° 44′ 6″.

Lac la Biche House on Lac la Biche in Lat. 54° 56′ 30″, Long. 112° 12′.

Green Lake House in Lat. 54° 17′ 9″. Long. 107° 40 35″, Isle a la Crosse House in Lat. 55° 26′ 15″, Long. 107° 46′ 40″.

Versailles House on Lac la Ronge at the mouth of Rapid River.

Fraser's House at the head of Deer's River in Lat. 56° 20′ 22″, Long 103° 18′ 47″.

Indian Lake House, Churchill River, Lat. 56° 48′ 20″.

Musquawegan on the Missinippi (Churchill) River in Lat 56° 13′ 7″, Long. 100° 25′ 50″, Var. (1805) 12° 30′ east.

Rocky Mountain House on the north bank of the North Saskatchewan River, 1¼ mile above the mouth of Clearwater River, in Lat. 52° 21′ 30″; Long. 114° 52′.

Boggy Hall on the same river between the mouths Brazeua River and Wolf Creek in Lat. 53° 1′ 19″.

Muskako Fort on the same river, 4½ hours journey below Wolf Creek.

White Mud Fort on the north bank of the same river, at the mouth of White Mud Creek.

Fort Augustuss on the same river, a mile and a half above the mouth of Sturgeon River, in Lat 53° 44′ 52″, Long. 103° 11″, Var. (1799) 20° east.

White Mud Brook Fort on the same river, a days journey below Ft. Augustus.

Isle of Scotland or Island Fort 3½ hours journey above Fort George.

Fort George, close to the Hudson's Bay Company's establishments of Buckingham House.

Vermilion, 5 hours journey below Fort George.

Fort de l' Isle, a mile and a half above the mouth of Birch Brook, (apparently not far from Manchester House.)

Turtle River House a mile and a half below the mouth of Turtle Brook.

Fort de Milieu, two and a half hours journey below a Crossing Place (Ft. Carlton).

Hudson's House, two hours journey below the last, and 15 miles above Setting (Sturgeon) River.

Fort St. Louis, three and a half hour's journey below the Forks.

Fort la Corne, three-quarters of an hour's journey below the latter.

Isaac's House, 38′ Long below the Forks,

Nepoin House, 9⅔ miles below Isaac's House.

Hungry Hall, on this same river 14 miles above the mouth of Sturgeon River.

Cumberland House, near the H. B. Co's. Post.

Upper House on Red Deer River, Lat. 52° 47′ 44″, Long. 102° 14′.

Lower House on Red Deer River, 60 miles below the Upper House.

Upper House on Stone Indian (Assiniboine) River, Lat. 51° 46′ 58″, Long. 102° 24′ 55″, Var. (1797) 14° 40′ east.

Belleau's House on Snake Creek, half a mile north of Lat. 51° 51′ 9″.

Swan River House on the Swan River, 4¾ miles above its mouth, Lat. 25° 24′ 5″, Var. (1797) 9° 47′ east. Two other houses are mentioned on Swan River one 33½ and other 35½ miles above Swan River House.

Fort Dauphin on Dauphin Lake.

Grant's House on the east bank of the Assiniboine near the month of Little Boggy Creek, in 51° 26′ 10″, Long. 101° 57′ 3″ Var. (1797) 13° east.

Thorburn's House, on Calling River a few miles above its junction with Assiniboine River, in Lat. 50° 28′ 57″, Long. 101″ 45′ 45″.

McDonald's House on the Assiniboine near the mouth of Mouse (Souris) River, in Lat. 49° 40′ 26″, Long 99° 27′ 15″. Ash House on the banks of Mouse River, in Lat 49° 27′ 32″. Principal Mandan village on the Missouri in Lat. 47° 17′ 26″, Source of Missouri. worked out from accounts of the Mandan Indians, Lat. 45° 11′ 7″, Long 110° 17′ 8″. (A very good result for so rough a method).

Pine Fort, on the Assiniboine River, 16½ miles below the mouth of the Mouse River.

Poplar House, on the Assiniboine River, 16½ miles below the mouth of the Mouse River.

Popular House, on the same river, 53½ miles below the last, and 5 miles above Portage la Prairie.

Cheboillez's Old House, on Rat Creek, ¼ mile up from its mouth in Lat. 49° 33′ 58″.

Cheboillez's House, at the mouth of Summerberry (Pembina) River, in Lat. 48° 58′ 29″.

Baptiste Cadotte's House, on Red Lake River, in Lat. 47° 54′ 21″, Long. 97° 45′

Cadotte's old House, on Red Lake, in Lat. 47° 56′ 15″, Long. 95° 37′.

Sayer's House on Red Cedar (Cass) Lake, in Lat. 47° 27′ 56″, Long 95°.

Sand Lake House, on Sand Lake, in Lat. 46° 46′ 39″, Long. 93° 20′.

Fond du Lac House, 2 miles up the St. Louis River from Lake Superior, in Lat. 46° 44′ 2″, Long. 92°.

Lake Superior, in Lat. 46° 44′ 2″, Long. 92°.

Mille Lac Fort in Lat. 48° 48′ 37″, Long. 90° 49′ 31″.

Also a number of other forts between Grand Portage or Fort William and the mouth of the Winnipeg River.

Ottawa, February 25th, 1888.

A CONTRIBUTION TO THE STUDY OF THE FRANCO-CANADIAN DIALECT.

BY J. SQUAIR.

I spent a few weeks last summer in the parish of Ste. Anne de Beaupré in the Province of Quebec, and while there I carefully noted the expressions, words and pronunciation of words which struck me as peculiar in the speech of the *habitants* of that parish, and the present paper is an attempt to present the results of my observations.

In the matter of words and expressions I have noted those only which are not to be found in Oscar Dunn's *Glossaire Franco-Canadien*, (Quebec, 1880).

VOWELS.

(1) (*a*, *â*, in this list pronounced like *a* in English *hat*.)

*a*ller
*a*rchet
*a*rdent
*a*rgent
*a*rpent
*a*rrière
*a*tt*a*cher
b*a*g*a*ge
b*a*gue
b*a*l*a*i
b*a*ptême
b*a*ril
b*a*ttre
c*a*b*a*ret
c*a*cher
c*a*fé
c*a*ge
c*a*n*a*l
c*a*nne
c*a*non
c*a*p
c*a*r*a*ctère
c*a*rotte
c*a*rte
c*a*squette
ch*a*peau
ch*a*rger
ch*a*rité
ch*a*sse
ch*a*tte
ch*â*timent
cir*a*ge
cl*a*quer
comp*a*gnie
comp*â*tir
d*a*me
dés*a*stre
dét*a*chment
éc*a*rl*a*te
éc*a*rter
écl*a*ter
ég*a*l
embr*a*sser
eng*a*ger
ér*a*ble
esc*a*lier
escl*a*ve
ét*a*ble
ét*a*ge
f*a*ble
f*a*ce
fil*a*sse
fr*a*pper
from*a*ge
g*a*ge
g*a*lette
g*a*rde
g*a*rder
gl*a*ce
gr*a*ppe
gr*a*tter
gr*a*ve
grim*a*ce
h*a*che
h*a*rdi
h*a*rdes
im*a*ge
imp*a*tient
inst*a*ller
j*a*rdin
l*a*rge
l*a*rme
m*a*çon
m*a*l
m*a*rbre
m*a*rcher
m*a*ri*a*ge
m*a*rteau
m*a*ss*a*cre
mén*a*ge
misér*a*ble
mout*a*rde
n*a*ppe
or*a*ge
p*a*c*a*ge
p*a*r
p*a*rtir
p*a*tience
pl*a*ce
pr*a*tique
qu*a*rtier
r*a*ce
r*a*dis
r*a*me
r*a*v*a*ge
(je)reg*a*rde*
ret*a*rder
s*a*ge
spect*a*cle
t*a*rder
tr*a*ce
v*a*che

---

* I have however heard the *a* of *regarde* pronounced at Ste. Anne like *aw* in English *saw*

(2) (*a*, *â*, *à*, in this list pronounced like *aw* in English *saw*.)

(il) *a*
acc*a*bler
ach*a*t
am*a*sser
-*a*tion
avoc*a*t
b*a*s
b*â*timent
br*a*s
ç*a*
caden*a*s
c*a*rré
c*a*rreau
c*a*rosse
c*a*s
c*a*sser
ch*a*t
comb*a*t
cond*a*mner
crach*a*t
d*a*mner
déb*a*t
déj*à*
délic*a*t
embarr*a*s
ent*a*sser
estom*a*c
ét*a*t
frac*a*s
g*a*gner
g*a*rs
g*â*teau
g*â*ter
gr*a*s
ingr*a*t
l*à*
l*a*s
m*â*cher
m*â*choire
mir*a*cle
p*a*s
p*a*sser
p*â*té
p*â*tisserie
pl*a*t
ram*a*sser
r*a*s
r*a*ser
r*a*t
rep*a*s
sold*a*t
trac*a*s
v*a*

(3) (*a*, *â*, in this list pronounced like *au* in French *chaud*.)

*â*ge
*â*me
*â*ne
*a*rbre (first *r* silent)
b*a*se
b*a*sse
b*â*t*a*rd
bav*a*rd
baz*a*r
biz*a*rre
bl*â*mer
branc*a*rd
buv*a*rd
cad*a*vre
c*a*dre (*d* = *t*)
can*a*rd
ch*â*le
ch*a*r
ch*a*rette
ch*a*ssis
ch*a*rron
ch*â*teau
cl*a*sse
décl*a*rer
dép*a*rt
di*a*ble
disgr*â*ce
écr*a*ser
ég*a*rd
enc*a*drer
ép*a*rs
esp*a*ce
f*â*cher
gr*â*ce
has*a*rd
h*a*rt
inf*â*me
j*a*rs
l*â*che
l*a*rd
l*a*sse
m*â*le
m*a*rdi
m*a*rs (*s* silent)
p*a*pa
p*â*que
p*a*rc
(il) p*a*rt
pl*â*tre
p*â*te
plup*a*rt
qu*a*rt
r*a*cler
ram*a*sser
r*â*pe
r*a*re
r*â*teau
r*â*teler *
reg*a*rd
rel*â*cher
ren*a*rd
ret*a*rd
s*a*ble
Rich*a*rd
s*a*bre
t*â*che
t*â*cher
t*a*rd
t*a*sse
t*â*ter
v*a*se

N.B. There is a tendency to drawl the *a* or *â* of many of these words so that it comes to have almost the sound of *ou* in English *house*.

(4) (*ai* in this list pronounced like *è* in French *très*.)

aff*ai*blir
*ai*gle
*ai*gre
*ai*guille
*ai*le
*ai*mer
ar*ai*gnée
b*ai*sser
bed*ai*ne
c*ai*sse

---

* In the 2nd Sing. impera. of this verb the form *rôte* is often used.

capit*ai*ne
combin*ai*son
f*ai*ble
font*ai*ne
fr*ai*se
gr*ai*ne
l*ai*ne
l*ai*sser
m*ai*gre
m*ai*son
r*ai*son
retr*ai*te
s*ai*son
tr*ai*ter

(5) (*ai*, *aî*, in this list pronounced like *è* in French *très* with a tendency to the sound of *a* in English *father*.)

[*]angl*ai*s
aur*ai*s
av*ai*s
bal*ai*
dél*ai*
engr*ai*s
ép*ai*s
ess*ai*
extr*ai*t
f*ai*t
fr*ai*s
harn*ai*s
jam*ai*s
l*ai*d
l*ai*de
l*ai*t (*t* pronounced)
m*ai*s
mauv*ai*s
monn*ai*e
pal*ai*s
parf*ai*t
pl*aî*t
portr*ai*t
r*ai*de
souh*ai*t
tr*ai*t
v*ai*s
vr*ai*

(6) (*ai*, *aî*, in this list pronounced like *é* in French *été*.)

†angl*ai*se
aff*ai*re
*ai*der
*aî*né
*ai*r
*ai*sé
b*ai*ser
ch*aî*ne
ch*ai*r
ch*ai*se
cl*ai*r
compar*aî*tre
conn*aî*tre
contr*ai*re
cr*ai*nte
distr*ai*re
engr*ai*sser
ép*ai*sse
f*ai*re
fourn*ai*se
fr*aî*che
g*ai*
gr*ai*sse
h*ai*ne
m*ai*
m*aî*tre
mauv*ai*se
milit*ai*re
n*aî*tre
pl*ai*re
pun*ai*se
rafr*aî*chir
ros*ai*re
t*ai*e
tr*aî*ner
tr*aî*tre

(7) (*a*, *â*, in this list pronounced like *aw* in English *saw*; *il* and *ille* have the normal French pronunciation.)

b*â*iller
bat*a*ille
c*a*ille
éc*a*ille
m*a*ille
mange*a*ille
mur*a*ille
p*a*ille
poul*a*iller
r*a*iller
tir*a*iller
vol*a*ille

N.B. *ail*, *aille*, in the following words pronounced as commonly pronounced in French.

ailleurs
gaillard
médaille
travail
vaillant
vaille

---

[*] So also *écossais*, *français*, etc.

† So also *écossaise*, etc.

(8) In *faîne*, *aî* is a real diphthong, pronounced very much like *i* in English *fine*.

(9) (*e*, *è*, *ê*, in this list pronounced like *è* in French *très*.)

accepter
arrêter
avec
baptême
bêche
bête
bref
caresse
chef
ciel
conquête
crème
cruel
dépêche
-elle
empêcher
espèce
être
-ette
extrême
fidèle
fièvre
flèche
lèvre
mèche
mêler
même
messe
pêcher
pièce
prêcher
règle
rêver
suprême
trèfle

(10) (*e*, *è*, *ê*, in this list pronounced like *è* in French *très*, with a tendency towards the sound of *a* in English *father*.)

* alphabet
* après
* arrêt
direct
† elle
grève
nord-est (*st* silent.)

(11) (*e* in this list pronounced like *a* in English *father*).

affermir
auberge
averse
avertir
bercer
cercle
cercueil
certain
cerveau
chercher
cierge
commerce
conserver
convertir
couverture
diverse
divertir
enfermer
ferme
fermer
fervent
gerbe
germer
herbe
herse
infertile
merci
percer
perche
perdre
perdrix
perfide
perle
permettre
persécuter
persévérer
personne
persuader
perte
perversion
refermer
remercier
renverser
réserve
serment
serpent
serpette
service
servir
terme
ternir
traverser
verbe
verge
vermine
vernis
verser
verte
vertu
vierge

(12) (*e*, *è*, *é*, *ê*, in this list pronounced like *é* in Fr. *été*.)

* abbé
* accabler,
acier
amer
* arrière
assez
* caractère
carême
chêne
cher

---

* So in all words with same termination.

† *elle* is often pronounced *a* (*a* in father).

ch*e*z
cit*e*rne
cl*e*f
clerg*é*
coll*é*ge
conc*e*rt
couv*e*rt
crêpe
crête
d*é*s*e*rt
dess*e*rt
enf*e*r
ent*e*rrement
entêt*é*
env*e*rs
*e*rr*e*r
*é*t*e*rnit*é*
*é*vêque
gên*e*r
grêle
guêpe
gu*e*rre
hi*e*r
hiv*e*r
honnête
inf*e*rnal
lant*e*rne
libert*é*
li*è*ge
mercredi
(first *r* often silent)
perp*é*tuel
p*e*rsonnage
pied
press*é*
prêtre
prov*e*rbe
quête
s*e*rgent
s*e*rr*e*r
(il) s*e*rt
tête
t*e*rre
ti*e*rs
trav*e*rs
univ*e*rs
univ*e*rsit*é*
v*e*r
v*e*rdure
v*e*rre
v*e*rs
v*e*rt

(13) In *reine* and *teinte*, *ei* is a real diphthong. In *peine* and *reine*, it is pronounced like *è* in Fr. *très*. In *neige*, it is pronounced like *é* in Fr. *été*.

(14) (*oi*, *oî*, *oy*, *oê*, in this list pronounced like *ou* in Fr. *oui* + *é* in Fr. *été*.)

adr*oi*t
ang*oi*sse
appriv*oi*ser
* av*oi*r
b*oi*re
b*oi*sson
b*oî*te
b*oi*teux
chin*oi*se
ch*oi*sir
cl*oi*son
c*oi*ffer
cram*oi*si
cr*oi*re
(je) cr*oi*s
(je) cr*oy*ais
(je) cr*oi*rai
cr*oi*ser
cr*oî*tre
désesp*oi*r
dr*oi*te
él*oi*gner
entonn*oi*r
esp*oi*r
étr*oi*te
f*oi*re
gl*oi*re
hist*oi*re
j*oi*ndre
j*oi*nte
mâch*oi*re
mange*oi*re
mém*oi*re
mir*oi*r
m*oi*
m*oi*ndre
m*oi*sir
mouch*oi*r
n*oi*r
*oi*seau
pass*oi*re
p*oê*le
p*oi*nte
p*oi*ntu
p*oi*re
p*oi*son
p*oi*sson
p*oi*trine
p*oi*vre
s*oi*r
tir*oi*r
t*oi*
t*oi*son
vict*oi*re
v*oi*ci
v*oi*là
(je) v*oi*s
(il) v*oi*t
v*oi*sin

N.B.—In this list the following peculiarities are to be noted :—In *adroit*, *droite*, *étroite*, *oi* is often pronounced like *è* in Fr. *très ;* in *croire* and (je) *crois* it is often pronounced like *é* in Fr. *été ;* in *cloison* the *l* is often silent, and in *croiser* and *croître* the *r* is often silent.

(15) (*oi*, *oy*, in this list pronounced like *ou* in Fr. *oui* + *è* Fr. *très*.)

bourge*oi*s
chin*oi*s
ch*oi*x
compt*oi*r
courr*oi*e
cr*oi*x
dem*oi*selle
dépl*oy*er
détr*oi*t
d*oi*gt

---

* So all verbs with same termination.

(je) d*oi*s
(que je) d*oi*ve
dr*oi*t
effr*oi*
empl*oi*
emp*oi*s
emp*oi*sonner
endr*oi*t
étr*oi*t
expl*oi*ter
f*oi*
f*oi*e
f*oi*n
f*oi*s
fr*oi*d
j*oi*e
l*oi*
l*oi*n
m*oi*ns
m*oi*sson
n*oi*x
*oi*e
pat*oi*s
p*oi*gnet
p*oi*ng
p*oi*nt
qu*oi*
(je) reç*oi*s
r*oi*
s*oi*
s*oi*e
s*oi*f
s*oi*gner
s*oi*t
t*oi*le
t*oi*t
v*oi*le
v*oi*ture
v*oi*x

N.B.—The following peculiarities are to be noted in this list:—In *étroit*, *froid*, *oi* is pronounced often like *è* in Fr. *très; d* in *froid* is pronounced like *t*.

(16) (*oi*, *oy*, in this list pronounced like *ou* in Fr. *oui* + *a* in Eng. *father*).

b*oi*s
empl*oy*er
env*oy*er
f*oy*er
incr*oy*able
l*oy*er
m*oi*s
m*oy*en
p*oi*ds
p*oi*s
renv*oy*er
s*oy*ons
tr*oi*s
v*oy*age

(17) *an* and *en* in *avant*, *argent*, *vent*, are often pronounced like *in* in Fr. *vin*.

(18) *au* becomes *a* (*a* in Eng. *hat*) in *sauvage*.

CONSONANTS.

b often becomes *m* in *houblon* (pronounced *omnon*).
c = (*k*) has sometimes a peculiar sound between *k* and *t* as in *aucun* (almost *otien*).
c = *g* in *canif*.
ch = *j* (as in Fr. *jour*) in *cheval*.
d = *d* + *g* (as in Eng. *gender*) before *i* and *u* in *dit*, *dur*, &c.
d = *l* sometimes in *cadenas*.
d is sometimes inserted in *genre* between *n* and *r*.
d = *t* in *cadre* and *froid*.
g = *c* often in *glas*.
h is never heard as far as I have observed.
l = *r* sometimes in *allaiter*.
l often becomes *l mouillée* in such words as *aller*, *ballade*.
l is often silent in *cloison*.

l mouillé is completely vocalized.

l = *n* in *omelette* and *houblon*.

r is often silent in *croître*, *arbre*, *mercredi* (first *r* in each) etc. *Comprenait* often becomes *compernait*.

t = *k* often in *amitié*, *patate* (second *t*.)

t = *t* + *ch* (as in Eng. *church*) before *i* in *parti*, etc.

WORDS NOT FOUND IN OSCAR DUNN'S *Glossaire Franco-Canadien*:

autre. *Vers le quinze de l' autre mois:* towards the fifteenth of next month. (Heard once.)

belouet (*Vaccinium Canadense* and *corymbosum*), blue berry or huckle-berry.

(This is no doubt the word *bluet*. See Littré.)

bête puante (*Mephites mephitica*), skunk.

biseau (*?*), a small sheaf.

bois blanc (*Tilia Americana*), basswood.

brayer (no doubt *broyer*), to crush flax; *braie*, instrument for crushing flax; *brayage*, action of crushing flax; *brayeur*, the person using the *braie*; *braierie*, the place where the *brayeurs* work. (These words are used by M. LeMay in his *Pèlerin de Ste. Anne*. Quebec, 1877.)

corvée, bee. A gathering of friends and neighbours to assist in some piece of work such as threshing, cutting wood or the like.

crine, horse's mane.

devers, towards.

épinette rouge (*Larix Americana*), tamarac.

épinette blanche (*Abies alba*), spruce, (in Littré: *Abies Canadensis*).

fiche, iron bolt, (general term; in Littré: *Cheville de fer sur laquelle on roule les cordes des instruments, tels que pianos etc.*).

filer, to grind (scythe etc.).

gibier, tame fowl.

gond (*?*), staple (for a latch etc).

icite for Fr. *ici*.

javelier, grain cradle.

mi (*?*) (*Phleum pratense*), timothy (a grass).

morfiler, to whet (scythe etc).

pierre de meule, whetstone.

planche, ridge (in a field); also a sort of four-wheeled carriage, called by English Canadians a "buckboard."
pruche (Abies Canadensis), hemlock, (Littré gives *prusse* or *pruce*).
quinteau (?), stook of grain.
raie, furrow, (in Littré); *sillon* not used.
rale (?), branch (of tree).
râpe savage (Lappa major), burdock.
sapin (Abies balsamea,) balsam.
par secousses, off and on.
siffleur (?) (Procyon lotor), racoon.
taure, heifer, (in Littré); *génisse* not used.

N.B—Words whose orthography is doubtful are followed by *(?)*.

REMARKS ON THE DISTINCTIVE CHARACTERS

OF THE

CANADIAN SPRUCES—

SPECIES OF PICEA.

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Our native spruces (belonging to the genus *Picea*) have received attention at different times from many botanists, but their conclusions in regard to the number of species, and the exact relations of these to each other, have not been concordant. It seemed desirable to invite attention again to the subject, and this was done in a preliminary paper read in Section IV of the Royal Society of Canada, at the Meeting held at Ottawa in May last (1887). The discussion on that occasion, and subsequent correspondence, have shown that the matter is not without interest, and have suggested the desirability of publishing some of the facts then stated, as well as results subsequently reached, together with some historical details,—so as to indicate our present knowledge on the subject, the information still needed, and the directions in which profitable enquiry may be made. Local observers and collectors throughout the Dominion, and travellers visiting northern points, may do much to aid in determining the geographical range of the several species, varieties, and forms, and the continuity or intermittence of their distribution in different regions.

The beautiful evergreen coniferous trees called "spruces," form a marked feature of the wild forest lands of the Canadian Dominion, especially in the Atlantic maritime districts, and in the tracts of country lying around the great lakes. The spruces are valued, not only for their large yields of useful lumber, applicable to so many purposes of life on land and sea, and for the summer shade and winter shelter which, as living trees, they afford our dwellings, but they are likewise regarded with interest, and as having some importance, from scientific points of view. How far the differences in structure and habit presented by the several species, and their aberrant or so-called intermediate forms, are to be regarded as indicative of genetic differences, or may be accounted for by the mere effects of past or present external conditions, is a question of more than incidental interest. It naturally leads to a comparison of these trees with their allies in other parts of the northern hemisphere, far beyond the range of the present Canadian forest, immense as it is, and to the consideration of other facts bearing upon their probable ancestry, in regard to which, however, the results, so far, are insufficient to warrant satisfactory conclusions.

These trees, and their extra-Canadian allies, have been variously described by botanists, at different times, under the several generic names: *Pinus*, *Abies*, *Picea*. Linnæus, upon whose system our nomenclature is founded, embraced under *Pinus:* the true pines, the Lebanon cedar, the larch, the silver (or balsam) fir, and the hemlock. In selecting specific names for the silver fir and spruce, he adopted those used by Pliny and other classical writers, who called the spruce *Picea*, and the silver fir *Abies*. But he unfortunately transposed these names, calling the spruce *Pinus Abies*, and the silver fir *P. Picea*. This opened the way for much confusion, for when the old aggregate genus *Pinus* came to be successively divided up into segregate genera, and the classical names were adopted as generic ones, choice had to be made between two courses,—either to apply these names so as to denote the trees intended by the classical writers, or to use them, at variance with classical usage, in accordance with the Linnæan nomenclature. As has just been indicated, succeeding botanists separated the true pines, and other marked groups of the Linnæan genus *Pinus*, into separate genera; at first the spruces and firs were classed together under the one generic name *Abies*. Link, in 1841, separated the two groups into distinct genera, restoring the classical names, *Picea* for the spruces, and *Abies* for the firs. But in Britain, where Coniferæ have been grown to an enormous extent, both for ornament and use, especially since the middle of the present century, a silver fir continued to be almost universally called a *Picea*, and a spruce an *Abies*,—until within the last few years, when English scientific writers have adopted Link's use of the names, and thus adapted their nomenclature to continental custom and classical usage. Among English foresters, gardeners, and nurserymen, however, the old way, so long familiar, will be given up slowly, and not without regret.

The Canadian Spruces, so far as regards their distinctive specific characters, have been a puzzle to botanists. They were not known to Linnæus. Miller and Aiton recognized two species, *alba* and *nigra*, and Lambert introduced a third (*rubra*) that had been recognized by the younger Michaux as a variety of *nigra*. Accordingly, in most of the works on Coniferæ published since Lambert's (1825) by European and English botanists,* we find the three species described without hesitation. But, there have not been wanting expressions of doubt as to the permanent distinctness of the third species, and of suspicion even, that all three were connected by intermediate forms so closely as to be doubtfully entitled to rank as more than varieties of one species. A full statement of synonymy would occupy too much space, and indeed be out of place, in this publication; a brief indication of the views held by a few prominent botanists will suffice for the present.

In Persoon's Synopsis Plantarum, 1807, (the authorship of which is believed to belong to Richard), *rubra* is described with rubicund cones, slightly bilobed scales, and red brown bark, and is curiously enough assigned geographically to Hudson Strait; *alba*, with incurved leaves, lax subcylindrical cones, entire scales, whitish bark; *nigra*, with straight leaves, ovate black-purple cones, scales undulated at the margins, bark blackish.

Endlicher, in the standard work on Coniferæ for the time (1847), "Synopsis Coniferarum," characterized three species as follows: (pp. 112–15): *alba*, cones subcylindrical, lax, pendulous, scales broadly obovate undivided, entire, (faces of leaves whitened glaucous, pulvinuli pale brown, cone long-stalked, cylindrical or ovoid oblong, 2 to 2½ inches long, largest diameter, ½ inch., scales quite entire, at first green, changing to pale brown); *rubra*, cones ovate-oblong, scales split into two lobes, margin otherwise quite entire, (doubtfully distinct from the next, leaves more acute, cones larger, green when young, scales constantly and evidently split-lacerate irregularly, margin otherwise entire, the wood becoming reddish); *nigra*, cones ovate-acute, scales obovate, undivided, erose, denticulate, bark blackish, faces of leaves white-dotted; cones shortly peduncled, drooping, an inch and a-half long, at first purpurascent, finally reddish brown, scales with thin margins becoming undulate-lacerate.

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* Persoon, Antoine, Don, Loudon, Link, Parlatore, Endlicher, Gordon, etc.

Professor Beck, in the Botany of the Northern and Middle States, (1833), which formed the precursor of Dr. Asa Gray's standard Manual, described three species (p. 340), as: *nigra*, * * * leaves straight, strobile ovate, scales elliptical, undulate on the margin, erosely denticulate at the apex; *rubra*, * * * strobile oblong, scales rounded, somewhat two-lobed, entire on the margin; *alba*, leaves incurved, strobile subcylindrical, loose, scales obovate, very entire.

I have not been able to refer to the first edition of Dr. Gray's Manual of Botany of the Northern United States, (published in 1848), but in the second edition (1856) the red spruce of Beck is dropped, and only *nigra* and *alba* described,—the former with dark rigid sharp green leaves, cones ovate, or ovate-oblong, (one to one and a-half inch long), the scales with a thin and wavy or eroded edge,—a common variety in New England having lighter coloured or glaucous-green leaves, rather more slender and loosely spreading, and indistinguishable from *alba* except by the cones. *A. alba* is characterized as having oblong-cylindrical cones (one to two inches long), the scales with firm and entire edges; otherwise as in the lighter-colored variety of the last. The remark is added: probably these two, with the red spruce, are mere forms of one species.

In subsequent editions of the same work, the descriptions are amended, the leaves of *nigra* being characterized as either dark green or glaucous-whitish, and the cones are said to be recurved, persistent, whilst those of *alba* are two inches long, nodding, cylindrical, pale, deciduous, the thinner scales with an entire edge, (the latter a handsomer tree than the former, more like a balsam fir). These descriptions point to the red and black spruces being both included under *nigra.*

Professor Alphonso Wood, in his Class Book and Flora of the United States and Canada, also characterized only two species: *alba,* with incurved leaves, cones lax, subcylindric, with entire two-lobed scales; *nigra,* with straight leaves, ovoid cones, scales erosely dentate at the edge.

Dr. Chapman, in the Flora of the Southern United States (1860) likewise gave two species (pp. 434–5): *nigra,* leaves dark green, cone one and one-half inch long, ovate, or ovate-oblong, the scales with a thin wavy or denticulate margin; *alba,* leaves more slender and less crowded, light green, cones 1 to 2 in. long, oblong cylindrical, with the scales entire.

The late Prof. Brunet, of Laval University, an acute and careful botanist of whom Dr. Gray had a high opinion, described three forms: *alba, nigra,* and a variety *grisea* (Canadian Naturalist, new series, vol. iii., p. 108).

The Abbé Provancher, in Flore Canadienne, characterized *alba* and *nigra* clearly.

The late Andrew Murray, who took so much interest in American Coniferæ, in his later writings ignored *rubra.*

Professor Fowler, in his carefully prepared list of the plants of New Brunswick, gives two species, *alba* and *nigra,* as common throughout that province.

Prof. Parlatore, in the Monograph of Coniferæ in De Candolle's Prodromus, Vol. XVI., second section, pp. 413–14, published in June, 1868, recognizes our Canadian species as three: *nigra,* the black spruce or double spruce of Anglo-Americans; *rubra,* with leaf-faces albo-glaucescent (indicating that he probably had a form of *nigra* in view); and *alba*, with oval-oblong, or oval-cylindrical cones, pendulous, on longer branchlets than the others, (the geographical range extending to the Rocky Mountains, on authority of specimen from Bourgeau).

In Dr. Robert Bell's chart of the northern limits of trees forming the Canadian forests, the two spruces, *alba* and *nigra* are lined together.

Prof Macoun, in the Catalogue of Canadian Plants of the Geological Survey of Canada, gives two species, combining *rubra* with *nigra*.

Sir Joseph Hooker, in his tabulation in the Outlines of Distribution of Arctic Plants (Linnæan Transactions, 1864), gives only *alba* and *nigra*, and Sereno Watson, in the Botany of California, also dismisses our spruces in N.E. America as "two species."

The following descriptions of the several species are not thrown into systematic form, being merely intended to call attention to points of difference, and to suggest observation and enquiry, so that the necessary information may be obtained for the formation of accurate and permanent diagnostic characters:

1. PICEA ALBA.—Link, in Linnæa, xv. p. 519.

Picea alba, the white spruce of Canada, is recognized at a distance, from the allied species, by the comparative massiveness of the foliage with which its horizontal or pendant boughs are clothed, and by its glaucous or whitish-green tint,—the leaves when newly expanded being pale and silvery, as if covered with the most delicate coating of hoar frost. This appearance, however, is caused by the individual leaves not being wholly green, but having longitudinal rows of apparently white or colourless dots or spaces, owing to the non-development of chlorophyll in certain surface cells at regular intervals. The old bark of the stem is grayish, not dark-colored, and the young shoots of the year present a smooth, shining, ivory-white surface, altogether destitute of trichomes or roughness of any kind. The leaves vary in actual size with the vigour of the tree, but are longer in proportion than those of either of the other species; the leaf-bases from which they arise are arranged uniformly around the horizontal branches, but, although spreading in direction at their bases, are more or less curved upwards in a secund manner, presenting a nearly uniform flattened brush-like surface of foliage. The cones vary in absolute size, according to vigour of tree, etc., but are always of much greater length and usually more slender than those of the other species, being nearly cylindrical, not sensibly thickened in the middle as in *nigra*, nor below the middle as in *rubra*. Dr. Bell well expresses their form as finger shaped. The scales are also more numerous than in the allied species, and the spiral arrangement is different. The cones are green at first, the individual scales being sometimes clouded with a slight brown band-like patch on the exposed part, but not extending to the edge. In ripening, the green color mellows into a more or less decided straw color, but the cones when mature are never either dark or decidedly reddish. When of a lively straw-color, and profusely produced all over the tree, as we often see them along the shore, hanging down from the drooping tips of the young branchlets, the contrast with the bright silver-frosted needle foliage is very pleasing, so that the white spruce is one of the most ornamental of our native trees, and admirably adapted for sea-side shelter. The edges of the cone scales are always quite entire.

Prof. Bell, M.D., President of the Fourth Section of the Royal Society, has very kindly made careful observations, and communicated them to me, on the several points of difference between the white and black spruces. Through his kindness, also, I have had opportunity of examining specimens from widely separated localities throughout the Dominion. His opportunities of travel, for observation and collection of specimens, during his long connection with the Geological Survey of Canada, have been exceptionally favorable. Dr. Bell points out that the most obvious distinctions between the black and white spruce are (1) that the latter is a larger tree than the black, coarser, lighter in general color, as well as in color of bark, twigs, etc.; (2) that, in the white spruce, the boughs are stiffer, more vigorous, and flatter than in the black; (3) that the cones differ in many ways; in the white, they are scattered all over the tree, although most abundant near the top, and drop off every year, whereas the black spruce cones adhere for two, three, four or five years—the current year's crop being at the top (mostly), the previous year's next below, that of the year before still farther down, etc., the quantity of cones diminishing downwards and their age increasing. (4). The white spruce cone is finger-shaped, and green in color till it dries and opens, whereas the black is deep purple and plum-shaped, bulging in the centre. (5). The white is attached by a straight peduncle, the black by a curved thickening one. (6). The number of scales in each is very different, numerous counts of the scales of cones from many trees in northern regions of the Dominion yielding the following results: the white spruce cone seldom has fewer than 60 scales or more than 90—average about 70; whilst the black seldom has many over 30, the average may be about 33,—so that the white spruce cone has more than double the number that the black has. Eleven white spruce cones from a tree at Kingston, Ontario, gave an average number of 77, and of five cones of the same from a tree at the Emerald Mine near Buckingham, (Co. Ottawa, P.Q.), the average is 61.

The white spruce is observed especially along the shores of the ocean, estuaries and lakes, as in Cape Breton Island, around the Atlantic and Bay of Fundy shores of Nova Scotia and New Brunswick, also around the shores of the St. Lawrence Gulf and up the St. Lawrence River, and along the Ontario lakes. Dr. Bell sends a beautiful photograph of this species, showing its characters well, from Grand Lake House, on the Upper Ottawa. I have a specimen collected at Lake Winnipeg by his Hon. Lieut.-Governor Schultz, M.D., in the summer of 1860.

I desire specially to call the attention of observers to one point in regard to the geographical distribution of *Picea alba*. For many years it has appeared to me to be essentially a maritime species, growing around the Atlantic and northern coasts of Canada, and extending by way of the St. Lawrence westward to the great lakes, as far, at least, as shewn by Governor Schultz's specimen, as Lake Winnipeg. Its absence in *inland* localities is not noticed, so far as I have ascertained, in published works, yet, even in the narrow peninsula of Nova Scotia, bounded on one side by the Atlantic Ocean, and on the other by the Bay of Fundy and waters connecting with the Gulf of St. Lawrence, the absence or scarcity of this tree in inland localities, or even in such as are only a few miles distant from the shore, is very marked. It appears, therefore, to be especially desirable, in recording localities for its occurrence, to note their distance from seaboard or great lakes. I have already endeavored to impress upon observers the consideration that the only reliable material for tracing geographical distribution must consist of substantial data, actual local observations carefully noted and authenticated by specimens, corrected, reduced and compared, after the manner of H. C. Watson, and left on record in such form as to render elimination of errors possible, and that mere general impressions received by travellers over the country, although often of great practical value, are not to be regarded as absolute scientific results. * In the early days, when Douglas and Thomas Drummond were solitary wanderers over the Continent, and Menzies was touching the coast at Chebucto and nameless points on the Northern Pacific shores, every scrap of information, and especially their notes on range of species, was of substantial value, but now we have the means of working out problems by more systematic and scientific methods, and of eliminating the errors of individual observation.†

2. PICEA NIGRA, *Link*, in Linnæa xv, p. 520.

The black spruce is a sombre tree, the old bark of dark color, the surface of young shoots of the year of a dark brown, and clothed with a short sparse fur of thick short curved trichomes. The foliage is of a decidedly dark green colour, but distinctly glaucous or hoary. The leaves are short, almost straight, radiating from the branch in a bottle brush fashion at a nearly uniform angle except that they are turned away from the lower surface of the branch. The leaves (as in other species) vary in size with vigor of tree, but are always much shorter than in the other species, and blunt at the apex. The cones, when young, are of a deep purple, or purpurascent color, becoming reddish-brown as they ripen, darkening with age, and ultimately changing to a deep dark gray-black when old. The other species drop their cones during the first winter after they are formed; *P. nigra* retains them for several years, the recent crop of the year being near the top of the tree mostly, the previous years next below, that of the year before further down, and so on, the cones diminishing in quantity downwardly as their age is increased. The cone is attached to its branchlets by a curved stalk (whereas that of *P. alba* is straight), and the cone itself is conspicuously much wider in the middle than towards base or apex ; several of these differences are taken from Dr. Bell's notes, but are entirely in accordance with my own observations.

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* See Trans. Royal Soc. of Canada, Vol. II. Sec. iv. p. 16.

† *Abies arctica*, Murray, Seeman's Journal, 1867, p. 273, cum ic., is referred by Parlatore as a variety of *alba.*—DC, Prodromus, XVI., p. 414. On same page there is description of something no doubt quite different, *Abies arctica*, Cunningh., ex Henk. & Hochst. This is referred to *rubra*

This species appears to be widely distributed, both in coast and inland districts, extending apparently far north, and in the south ascending the mountains. Black spruce is famed among lumbermen as a tree yielding sound, strong and lasting timber. In Nova Scotia it is found, not on dry ground, but on wet flats, apparently irrespective of atmospheric moisture. In inland districts, groves of it occur in the red spruce forests, on the wet lands around lakes, and along river sides, and on shelving terraces on the hill sides, but it also grows down to the sea-shore intermixed with *P. alba*—the favoring condition apparently being a retentive moist soil. In the north and north-west, the tree appears, from accounts and photographs received, to be more vigorous than along the Atlantic region of Nova Scotia.

3. PICEA RUBRA, *Link*, in Linnæa, xv, p. 521.

Picea rubra, the red spruce, is readily known by its clean, uniform bark (not broken into large scales) of a distinctly reddish color, by its long slender shoots, giving it the appearance of being a more rapid grower than *nigra*, but not so robust in habit as *alba*, and by its bright green foliage, without any trace of hoariness or glaucescence. The leaves, as compared with those of the allied species, are short, incurved, not so secundly as in *alba*, but bent inwards towards the branchlets, and on the leading shoots they are more or less closely appressed to the leader, giving it a very elongated slender appearance. The year's shoots are of a lively chestnut-red color, and are beset with short, erect, thickish, curved, epidermal processes (trichomes), which arise especially around the edges of the flat basal plates of the leaf-bases, variously called peg-processes, sterigmata, etc. The cones are of a bright chestnut color, regularly ovate in form. The wood is softer than that of the black spruce, it is also less enduring under open air exposure, as we know from experience; every season the red spruce poles have to be replaced more frequently than the black in fences.

The best general description that has hitherto been published of *P. rubra* is that of my late friend William Gorrie, in the Transactions of the Botanical Society of Edinburgh, Vol. x, p. 353. Mr. Gorrie's description was taken from the tree as observed by him in the plantations and pleasure grounds in Britain, but, so far as it goes, it corresponds entirely with the tree as seen in the Nova Scotian woods:—"The red spruce fir, or Newfoundland red pine, is found in Nova Scotia, some parts of Lower Canada, and northward to Hudson Bay, but is not included in Dr. Asa Gray's Flora of the Northern United States. It is said to be a better and finer tree than either of its allies—the black and white spruces—from which it further differs in being entirely devoid of that glaucous green by which the leaves of these two are distinguished. It is in fact exactly like the common Norway spruce in the color both of its foliage and young branches, but differs from it in its thinner and more slender growth, shorter leaves, and much smaller cones. From this close resemblance in color of *rubra* and *excelsa*, Americans call the latter the red spruce of Europe. Like the *alba*, the *rubra* drops its cones in the course of the first winter and succeeding spring, while those of *nigra* are retained on the tree for two or more years. Like its two American associates, *alba* and *nigra*, *rubra* seems to delight in moist soils containing a proportion of peat, and moist upland climates. Those now growing at Tynehead were reared from seeds gathered in Newfoundland, and a portion of the plants which were planted on good, dry, heavy soil, within from two to three miles, and at half the altitude, dwindled away after the first few years, till they entirely perished. The trees at Dunmore are no doubt growing at a low altitude, but they are sheltered by a high wooded bank on the south, and are on a damp bottom. Mr. Andrew Murray, a distinguished member of the Botanical Society, and recognized authority on Coniferæ, has ignored the existence of *rubra*, but he has probably never seen it growing, as, although long introduced, it is still scarce in Britain." In illustration of these remarks Mr. Gorrie exhibited and presented to the

Botanical Society branches and cones of (1) *P. rubra* taken from a group of trees growing on the railway banks, near Tynehead Station, in Midlothian, at an altitude of about 800 feet. The trees had then, (13th January, 1870), been about fifteen years planted, and were from 12 to 18 feet in height; (2). *P. rubra*, from a group of trees growing in drained and improved ground, which must once have been marshy, in Dunmore Park, near Stirling, Scotland, not 50 feet above high-water mark, seemingly about the same age as the last, and from 15 to 20 feet in height; (3). *P. alba*, from near Tynehead Station; (4). *P. nigra*, from Dunmore Park.

In addition to acknowledgements for specimens already made in this paper, my best thanks are due to Mr. John MacAloney, of Halifax, who collected for me the several forms growing on the shores of the Bay of Fundy; to Mr. W. S. Calkin, B.A., now of Cornell University, who, while an undergraduate of Dalhousie College, obtained those of the district around Truro; and to Mr. S. J. McLennan, B.A., who made similar collections around Sydney Harbour, Cape Breton.

AN ELOCUTIONARY DRILL CHART.

T. B. BROWNING, M.A.

THE BREATH AND ITS GOVERNMENT.—The breathing required in public speaking or reading is a voluntary act which calls into play two independent sets or double sets of muscles, and may therefore be considered of two kinds, thorassic and diaphragmatic. The first is more commonly used by women, the second by men. In the first, you alternately raise and lower the ribs, that is, expand them upwards, outwards, side-wise, and towards the back, separating one from the other; and, again, compress them. The muscles used in the operation act upon the backbone as a fixed line, and their action is said to be in part direct, in part indirect. Figure No. 1 shows the chest as expanded; in No. 2 it is collapsed. The extension-motions given in the chart to reach these respective positions are similar to the means employed to restore breathing in persons who have been rescued from drowning, and, in certain cases well-known to the medical faculty, to produce or increase respiration in young children. Figure No. 3 exemplifies the action of the diaphragm.

Ordinarily in public reading or speaking, we should inhale noiselessly and through the nostrils only. If you raise the tongue against the roof of the mouth at the same time that you dilate the nostrils and contract the respiratory muscles, you may fill the lungs in an instant without closing the mouth. Times occur when you must draw your breath through the mouth and with noise, as in gasping; for example, where disease is simulated or trying situations are depicted; but, except where a pronounced effect is to be produced, such labored inhalation should be avoided, as both prejudicial to health and destructive of vocal power.

The retaining of air in the lungs is an important point in the government of the breath. You hold the inspiratory muscles contracted, close the glottis as in swallowing and aid the operation by shutting as far as possible the air passages of the mouth and nose. If you ask for what time one may retain his breath without injury, the answer is: it varies with the person and his degree of skill. One may hold for a minute; for another forty-five seconds may be too long. The end to be gained is control over the muscles and, as in gymnastic exercises, that which is to be avoided most is straining.

Except for rest, the breath is to be set forth through the mouth. As in retaining, time has been divided into short, medial, long, very long. You may empty the lungs, as it were, at a blow or within a measurable time. In all cases expiration should be free, that is, without scraping, without obstruction. Whatever time you practice, a regular, even and full flow will give you more complete command than spasmodic or irregular jerks. The reader should imitate the athlete. In his private practice he will prolong his expiration to the utmost; in reading will not stretch beyond a quick recovery, but act within himself and at his best. To use up a breath as if it were one's last, necessitates, in almost every instance, an effort or gulping for the next, which is not more conducive to health, agreeable to an audience, characteristic of good delivery nor in itself more skilful, than "catching crabs" is evidence of superior oarsmanship.

Voluntary breathing is the foundation of public speaking. Under whatever defects one may labor, lisping, stammering or stuttering, if once he gain power over his respiratory muscles to use them at pleasure, he will be hindered neither by want of breath nor a surplus of it—the main stumbling-blocks of public speech—will not only avoid the throat-laceration which afflicts the clergy so deeply, but will have already overcome more than half the obstacles which lie in the way of distinct and effective delivery.

VOWELS—THEIR PRODUCTION.—How many vowels has the English language? Webster reckons 33, Ogilvie 14, Sweet 36, and other orthoepists say 40, 12, 9 or 6. There is no consensus of opinion as to the number of our vowels. How, then, may they be distinguished? Mr. Melville Bell gives a systematic answer. He subjects the mouth to minute experiment and classifies vowels mainly according to the positions which the tongue assumes in enunciation. Thus they are front, back, mixed; high, middle, low; round, etc. For purposes of illustration he uses diagrams. I doubt whether any one knows better than Mr. Bell that the lips, cheeks, tongue, hard and soft palates concerned in vocalization, differ both in size and shape in different persons; and that vowel positions which may suit one man may not, in minute particulars, be absolute for all. His directions are given generally, are easy of application and are subject to correction by the ear. "Visible speech" was a great step forwards not only in phonetics but in the understanding of our language.

But how do the sounds differ between themselves? Helmholtz experimented fully on the question, and has been followed by Koenig. They take the common European vowels and find the number of single vibrations they contain. This is for U 448, O 896, A 1792, E 3584, I 7168; so that, counting on the chart from left to right, you have a series of ascending octaves. Dr. Koenig has prepared a tuning fork for each vowel and adjusted a resonator to each. If you take fork A bow and apply it to the resonating chamber, you receive the tone of the Italian A; so with the others respectively. Here, then is a scientific basis for vowel classification, in which the personal equation is almost eliminated.

But though these sounds be used in French, Italian, German and other languages, have we them in English? Mr. Palsgrave says they lingered in the South of England till about 1500. If it be asked, do our vowel-names correspond with these sounds, the answer, with one exception, must be, No. Our language is peculiar. It is like a stately ship built of wrecks. Scandanavian, Danish, Norman conquests are embedded in it. Our spelling is a complex form which crept upon us from the south, and was made to represent another complex form or mass of complex forms which prevailed in more northern portions of England. Mr. Oliphant throws much light on the subject and shows how our vowels waged among themselves an internecine war before 1500. Thus

i takes the place of ae, e, ea, oe, ge, iht, w, y;
a " " " ae, e, ea, oe, ge, i, o, y;
e " " " a, ae, ea, eo, eow, i, ia, o, w, y;
o " " " a, aw, ae, ao, e, ea, eaw, eo, i, w, ow;
u " " " a, ae, eo, eow, e, i, o, oi, w, we, y;

("Old and Middle English

There was no king in Israel in those days, no tyrant compositor, and every man spelt as seemed good in his own eyes. One vowel is written for another indifferently. "The New English," in its early stages is equally belligerent. Thus

a takes the place of aw, awe, e, ea, eo, ge, i, y, o ;
e " " " ae, ea, ei, eo, ew, i, io, iw, o, oi, ow, u, ui, y;
i " " " a, ae, ai, e, ea, ee, eh, eye, o, ou, ow, u, y ;
o " " " a, ae, au, aw, e, eo, ew, i, ou, ow, u, y ;
u " " " a, e, eo, eu, ey, i, o, ew, ow, we, y, ye, v.

We have plain traces of the anarchy to-day. Dictionaries agree that a in fate is like e in they, a in fair like e in their, a in fall like o in form, a in liar like e in brier, i in ruin, o in major, and the second u in sulphur. Again, e in her is the same as i in sir, o in worm, u in fur, and y in myrrh ; the o in move cannot be distinguished from the oo in moon, or u in rule, while o in wolf is like oo in wool, and u in push. To cap the climax we are told that a has five distinct sounds, e six and o seven, as if distinct sounds do not constitute distinct vowels.

But if a has five distinct sounds why should it be named from one of them only? Not it alone but all our vowels have been so named, and, with one exception, named strangely. Shakespeare says, the whirligig of time brings in his revenges. In this case we have had ours. If invasion from the continent wrought sad havoc on English vowels, and nicknames arose from them, very likely in the manner which Mr. Earl points out, we have done our best to impose these nicknames on the languages of the continent. With respect to dead varieties, Greek and Latin, we succeeded in the attempt for several centuries, succeeded at least to our own satisfaction. These days a doubt has been ripening to a conviction that this course of action is not wise. Through the influence of philological study and under the leadership of Cambridge, English-speaking-people are beginning to raise themselves above the vulgarism, and are at once adopting a more rational mode of pronouncing the classic tongues, and are enquiring what vowel sounds their own language really has. If the question then be put thus, have we as vowels in English the five tones which are represented by the Koenig forks, call them what you will? the answer without an exception is, Yes. How could it be otherwise? They are octaves which embrace the compass of the human voice. We shall see, I hope, that we not only have them but that they dominate our speech. It may be, as some philologers say, they are universal.

But how do you produce these vowels? He that is whole needs not a physician. He that has a model and can imitate it correctly, is well off already. Others may find the following practice of service. Take fork A, vibrate and apply it to the aperture of the resonator till you perceive the sound distinctly. Then bring the fork vibrating to your mouth. If you obtain there a resonation as full, clear and strong, as that which comes from the resonance chamber, your mouth is in the proper position for sounding vowel A; if not, not. Practice will bring A and the other vowels.

I am indebted to Professor Loudon, of Toronto University, for the opportunity of practicing upon a very fine set of the Koenig forks with resonators. The vowel which I could most quickly produce was A, next, O, E, U, I, as they stand. After considerable practice I drew the diagrams which are set opposite the vowels in the chart. They are made for the lower register and may be serviceable by way of hint. I also had the aperture of the mouth, front view, for each vowel photographed, but as the cost of transferring them to paper is considerable, I must ask the members of the Institute to be content with the following measurements in inches. I need not say that I would scarcely have subjected my own mouth to this ordeal, had I another on which to experiment.

For A,	the lips	covering	the teeth	extreme height	1,	width	$1\frac{9}{16}$;
O,	“	“	“	“	$\frac{1}{2}$,	“	$\frac{3}{4}$;
U,	“	“	“	“	$\frac{3}{16}$,	“	$\frac{3}{8}$;
E,	“	“	“	“	$\frac{3}{4}$,	“	$1\frac{9}{16}$;
I,	“	“	“	“	$\frac{1}{4}$,	“	$1\frac{5}{16}$.

Practice upon the forks brings into clear relief the function which the mouth plays in singing and speaking. It is a resonant chamber for the vocal cords.

The strings of a piano from which you have removed the dampers, may take the place of the forks. Sound any vowel to any note directing the voice upon the strings. If and when you form the vowel pure, you will receive a full, loud and distinct resonation. Again, take a metal tube one end of which tapers wedge-wise to a narrow slit by way of mouth-piece, insert the other end into a flexible tube say of rubber, and its unattached end into the nozzle of a bellows which may be worked by hand or foot. Put the mouth-piece to your lips and ply the bellows gently. You will get a clear vowel sound when you place your mouth in a true vowel position. Those who cannot avail themselves of any of these methods may find it advantageous to practice on the short vowels of English words, as set out in table III., lengthening and modulating them as may be required.

In producing vowels, primary, intermediate, or compound, there should be no breathiness or wind-rush. An approved plan is to hold a lighted candle close to the mouth and shout. Sound vibrations are not likely to extingush the flame nor to throw it outwards. Breathiness is a blemish in all speech; in vowels, it is a measure of bad production; it should not be used publicly except where blemish and bad production are required, for instance, in representation of disease.

MODULATION.—We say thou is a personal pronoun, if a conjunction, and up a preposition. But in, "if thou thou'st him some thrice, it shall not be amiss;" "if me no ifs, I know not if; "he up with his staff and smote;" what parts of speech are they? I have no quarrel with our grammarians, but admire the ease with which in former days they swept obstructions from their path. Slang and license remain potent terms, and are explanatory in the manner of the scholastic dictum, nature abhors a vacuum. If she does, what then? Within certain bounds and these very wide, any word in English may be any part of speech, not by reason of its position, but of its employment. So a word or phrase in our language may take or require any modulation or any coupling of them. How many standard interpretations of Hamlet have we? One for each great actor who has studied and acted the part. Their different renderings consist not in textual variations, but almost wholly in different modulations. For this reason it has often seemed to me misleading to set down for practice in modulation phrases which are marked for one form only. The extracts wrested from their setting, bear very little meaning, and the pupil does not perceive why this and not that modulation is given. A better plan would be to carry one or a few phrases through all modulating forms, that the purpose or effect of the vocal change might appear. I would myself like to see a set of Shakespeare's plays according to a standard interpretation, or a volume of Bright's speeches marked for delivery in the manner say of Mr. Bell's "Emphasized Liturgy." It would show what an intimate relation there is between the outward expression and the inward feeling, and rid elocution of the common imputation that it is a sham, a fictitious something imposed on words. In this event as well as under present circumstances, to gain the power of modulation, to produce it at will, to cultivate and control it, one must dive beneath the word and exercise the voice mechanically, as in singing, upon that which alone may be modulated, namely, the vowel.

Modulation is said to be of four kinds--force, pitch, inflection, stress; or, counting quality, five. Throughout them as an under current flows the element of time. I do not refer to the distinction between vowels as long and short. Important as that may be in words, vowel interchange, the history of language, it concerns us here very little. Any and every vowel may be appreciably uttered in the 132nd part of a second, or be lengthened for a minute. Each modulation should be produced in every time.

CLASSIFICATION.—Orthoepists at the outset of their work are met with this difficulty; they must adapt the letter to the sound, the sound to the letter or confuse both. Our spelling grew very rigid in the last century and change of the printed character, so frequent in our early history, became a thing tabooed. It would have been well had the letters adopted represented the sounds of our language with a considerable degree of fairness. One other condition would permit a particular spelling to remain for all time; if no new sounds arose, and if the vowels hit upon remained substantially as they were. We know neither of these conditions obtain. In such event we would not have seven sounds indicated by character o, five by a, six by e, and so many more by u and i. Again, the characters would not interlock each other. In the last century a distinction was not drawn between the stability of a language and its rigidity, and people thought that unless spelling were made and preserved uniform, the language itself would somehow perish. Philological science began with Grimm's discovery of the law of consonantal interchange and may be perfected with a sufficient theory of vowel interchange. The preservation of obsolete letters, many of them inserted by way of mistake, is not so much an aid as a stumbling block to the student of language. His problem is this—what is the speech of a people, how has it developed, through what changes has it passed? The matters which he desires most to know are the changes which take place in language, that he may discover and apply the law of the change.

I make use of the vowels of the Koenig forks for many reasons. As already said, they embrace the highest and lowest tones of the human voice, are equi-distant one from another and are common to all speech. An objection such as this I have heard: they are universal and therefore not necessarily English. A universe that does not include English-speaking countries, or universal vowels that are not necessarily found in the English tongue, would be rarities indeed; round squares simply, or round squares in the shape of isosceles, rhomboidal triangles. With other scholastic lumber they should be sent to Paris for exhibition next year at the centenary of the Great Revolution. Second, these sounds may be used as aids in and tests of vowel production. Mr. Ellis, who is, I suppose, our best authority on phonetics, says that few men, probably no man, pronounces his vowels precisely the same at all times. What elaborate supports singers have by way of accompaniments and forks! Yet they do not at all times strike every note truly. What would their execution be had they no accompaniments, no fork, and but a hazy notion that a particular note were required? This is precisely the situation of the vast majority of speakers. Again, as the sounds may be made externally and the same at all times, they not only give us a test of pure production, but enable us to allot their proper position to intermediate vowels and to detect compounds. This is their chief scientific function. A subordinate reason will have influence with many; that, as they are the principal sounds of European speech, practice upon them will render the acquirement of modern languages more easy. Those who are engaged in voice-training would add, from the experience of singers, that they are a better means than our vowel name-sounds of developing the riches and power of the human voice. To me their principal recommendation is that they set forth in clear relief the dominant characteristics of English, and may be adapted to our printed forms with very great ease.

Upon this basis our vowels would stand thus :

Single vibrations per second.	Primaries and Intermediates :		
7168	I	as in	pin, fin, peel ;
	é (ei)	"	her ;
3584	E	"	they ;
	á (ah)	"	man ;
1792	A	"	father, pun ;
	ó (awe)	"	form ;
896	O	"	pole, note ;
	ú (ou)		
448	U (oo)	"	pool, move, pull.

Some persons distinguish an intermediate ú between U and O; "not on thy *sole* but on thy *soul*, harsh Jew ;" but I do not find that it has established itself in our pronunciation. We have four compounds, that is, vowels formed by a quick transition from one vowel position to another.

o̦ (ow)	by combination of	A	and	U,	as in	how, house ;
i̦ (eye)	"	"	A	"	I,	"	pine, Cairo (Kiro);
oi̦	"	"	O	"	i̦,	"	oil, join ;
u̦ (you)	"	"	I	"	U	"	tune.

A glide from U to I (oo-ee) gives we, a sound which has been the subject of much controversy, is found in composition with g, at least in foreign names (g-oo-ee-ze), is often converted into i̦, and is generally represented by a consonant. It would seem that all compounds are more or less consonantal. I doubt not but the manometer would show this very clearly. The change from one position to the other would seem sufficient to produce a consonant. Compounds are, as it were, connecting links in word-systems, wherein the stepping stones, counting from the vowel side, are vowels proper, compounds, liquids, sibilants, mute consonants. The transition from a low to a high vowel gives a more or less distinct w, from a high to a low vowel a more or less distinct y sound.

Here, then, we have five primaries, three (or four) intermediates, four compounds, in all twelve (or thirteen to include ú) under which, I believe, all vowel sounds now received in English may properly be brought.

The primaries as they hold the extreme positions and the equidistant way-stations, the octaves, are fixed points that are easily verified, and will suffer neither increase nor diminution. Between each pair in the ascending scale there is room for many intermediates which no doubt will be formed. As language progresses finer distinctions are drawn. These find place particularly within the higher octaves. Why it should be we are not told, but the fact is that our speech has a tendency to mount higher and still higher, until, like vaulting ambition, it overleaps itself and falls into compounds. The process of multiplying intermediates and fusing compounds will no doubt continue as it has heretofore gone on, in the face of academies and all accepted orthographical modes. We may shut our eyes but must move with the stream. In these circumstances it is a part of wisdom to note a change when it is made and to accommodate one's self to that change. We need not make ourselves anxious lest future generations should not be aware how well their fathers of the nineteenth century spelt. They will desire to know chiefly how we sound our language. As for etymology, it is reasonably safe already, and is scarcely furthered by parading in words a mass of useless or misleading characters, be they never so beautiful. Nature is careful that organs which have outlived their usefulness should not be kept at full length as a clog on animals, but shall to all intents and purposes vanish. Philologers will find the rudimentary forms of words without further aid from absolute letters which have their proper place in storehouses such as dictionaries.

A word upon the forms assigned to intermediates and compounds. The acute accent shows that the number of vibrations per second has been increased from that of the octave; in other words, we have sharpened the normal sound. Accents are frequent in printed French, and are therefore familiar to the majority of persons who read. The subscript may not meet with so ready acceptance, but is used in Greek for the same purpose, is not hard to make and would, I think serve well to indicate the two-fold character of compounds.

We now come upon the question what is a vowel, and how is it distinguished from a consonant? Both are sounds and therefore consist of vibrations. In vowels they proceed without jar or interruption, are regular or periodic; in consonants they are not regular, not periodic, and proceed with more or less of jar. A manometer reflecting a gas jet which is agitated now by a vowel, and again by a consonant, will make the difference evident. The outline of the one appears uniformly curved, the other is ragged, jagged or distorted. The same instrument tells the internal difference between one consonant and another. Thus L and R have a kind of periodicity which is not so remotely separated from the contour of the vowels, at least of compounds, while G (hard) K. V. P. etc., are extravagant. The distinction is summed up thus: a vowel is a tone, a consonant is a noise. Tones are many, noises infinite.

But, it may be asked, if vowels are tones, and music consists of tones, more properly of compound tones or notes, how on this theory do you distinguish speaking from singing, speech from music set to words? Helmholtz provides the answer. He investigated the nature of music and resolved its development into three stages which for our purposes shall stand reversed. First, you have the harmonic music of our own day with its vast accompaniments, tempered tuning, subtile use of intervals once deemed dissonant and its reduction of all sounds to a key-note which governs throughout. Music of this kind has little in common with speaking. What a feeling of artifice, strainedness, unreality, one might almost say hypocrisy runs throughout our best operas! No sane man ever expressed himself so in real life, or could be conceived so to do. Galvanic grimaces are pawned on us for genuine laughter. The middle ages have another species which knows neither key-note, tempered tuning, nor accompaniment, rigidly discards dissonances, is built for many voices and called polyphonic. From this you may step back into the ancient world, say of Greece, where a monophonic or one voiced music reigns, without dissonance, key-note, tempered tuning, accompaniment or the need of any. It is a succession of unrelated or independent sounds in themselves regular which follow one another as the feeling, thought and rhythm of the verbal composition may demand. In this manner hymns and ballads were rendered at the Isthmian and other games. A partial survival of it may be detected in the intoning of religious service; while the improvised recitations of Italy are said to preserve it with very great fidelity. It is the noble art in a gelatine stage, yet between it and speaking there is a difference which is pointed out by Mr. Hullah when he says: "musical notes are discrete, speaking notes concrete." He refers to inflection, the chief charm of speech, and that which gives it so vast a range of expression. Now, withdraw inflections from speaking, as we have already abstracted key-notes and accompaniments with their dependencies from music, and you come upon a platform which both have in common, and from which they set out on their diverse developments, the monotone. The mayor's proclamation in Henry VI., the ghost's speech in Hamlet, the well known "oyez, oyez, oyez," of our courts are rightly said to be sung, or intoned, or spoken.

The cultivation of the speaking voice in respect of force, quality, time, stress and pitch, proceeds along the lines which singers adopt. The musical scale is used in common. Good singing demands a wider compass of compound tones than effective speaking which will be satisfied with three or four notes, at most an octave. To speak well, one should confine himself to those notes which he can best produce, and upon them practice every form of modulation, particularly the welding of notes or inflection.

In the chart exercises, A is selected, not because it only should be used, but for other reasons. A is the centre of the vowel system, is that tone which is most easily formed, which opens the mouth most widely and best develops the possibilities of the human voice. O, E, U, I, the intermediates and compounds are not to be neglected, but return should frequently be made to A.

The Consonants.—I had once thought of pursuing the subject from the compound vowels to the liquids, and thence to the more pronounced irregularities of the mute consonants. For the present I pass from that point of view, interesting as it may be or may some day become, begin at the other end, adopt as the basis of classification the formation-point of consonants in the mouth, beginning at the tip of the lips and proceeding step by step backward to the base of the tongue and soft palate. Within this space there are two regions of aspiration, the teeth and the back of the mouth, and two of light production, the tip of the lips and mid-arch of the hard palate. Accordingly, we have the mouth divided into three main and easily recognisable sections, and obtain from it the well established grouping into labials, dentals, gutturals; or the B. D. and G. groups. These are subdivided into classes, thin, medial and aspirate, and by a cross division into (1) mutes, stop or explosive consonants, (2) sibilants, (3) liquids, oral and nasal. The diagrams given in the chart indicate the central formation-point for each group.

It has been suggested and may be that the order of historical development of language was the reverse of that which I have indicated, namely, from the base of the mouth forwards. In support of this theory is instanced the gradual disappearance in our own and other cultivated languages of the heavy gutturals, the formation of ch (t-sh) and j (d-sh) within group D., and the interchange of aspirates of the G into those of the D and B group. Upon the other hand examples of an opposite process may be adduced. Again, it is said that as language progresses, aspirated sounds soften or differentiate themselves into medials or thin consonants of the same class, whether mutes, sibilants, or liquids. Thus T passes into P, D into Z, S, L, and many other cases may be cited. Both French and English have gone rapidly to sibilation. But the cause of this change is doubtful; it is doubtful, also, whether the process still proceeds in France. In our own tongue a strong tide has set in the opposite direction for more than thirty years under the influence of Germany. The tendency I speak off will appear clear to any who will compare a page of Carlyle with one from DeQuincey or Newman. Indeed, the function which is played by sibilants and liquids in the interchange of consonants within groups, or from group to group, whether in our own language at different periods, or as between ancient and modern tongues, is a matter which is by no means ascertained. Grimm's law applies to mutes and has been scarcely added to since his day. There are enormous gaps in it which await filling, and, for that purpose, use may be found both for liquids and sibilants. A sufficient theory of vowel interchange is also among the needs of the day. Meantime and that one may proceed on certainty, the table of consonants which is given in the chart corresponds to, accords with and may, I think, be profitably used to illustrate the discovery of the great German scholar, the basis of all philological science.

Certain consonants give rise to no small difficulty, as q, rh, w, wh, x. Q is to-day resolved into its elements k-w (or ku) and is therefore usually discarded from the class of independent consonants. Rh may be trilled at the teeth as well as the back of the mouth, and for that reason is often classed as a dental—others argue that it is a semi-vowel. While the formation point of liquids is not so defined or pointed as that for mutes, I believe, the balance of authority regards Rh as guttural consonant. The consideration which has seemed to me conclusive is its function in our older English, where its guttural character is very pronounced. So far back as James I's reign Hume, the grammarian, held w and wh as labials, and had for testimony the evidence of his lips. The interchange of v and w in many of our dialects and as between German and English gives countenance to his view, while the argument from analogy under Grimm's law is at least not against him, for instances are found on both sides plentifully. But other men have organs of speech and find that they pronounce w and wh clearly, while their lips are held forceably apart. In this plight the historical argument is of weight. W ordinarily represents the hard g of our older tongue. As for wh it is a curious transposition. We do not pronounce it in that form but rather as it was spelled, hw; not what, but hwat; a palpable guttural. X has two forms, ks and gs; expect, exact; it is differentiated into its elements like q, and should therefore I suppose be dropped. I do not give it place in the table so much because of its necessity as to call attention to the nature of the sibilants. They belong to every group and coalesce with every class. In standard English we do not retain ps, waps, the older sibilant of the B group which is now heard only among children, but convert it into sp, wasp. Of western speech probably Greek is the only one in which it is thoroughly embedded.

Many divide consonants into whispered and voiced. K, t, p, it is said, are whispered; h (hard) th, v, are voiced. But the second set may be whispered as well as the first, and the first, though evidently thinner, may be voiced as well as the second. Again, all medials, mutes, sibilants, liquids, admit both of whispering and voicing. I wish to go further, for I deem the matter important, and say that all sounds in speech, vowels and consonants, not only should be but for clear enunciation must be both voiced and whispered. In whisper you observe the mode of sound-production more accurately, detect an error more quickly, and may remedy it with greater ease. Those who labor under defects of speech as lisping, stammering, stuttering, find, if I may speak from my own experience and that of other persons from whom I have heard, that, next to regular breathing, the whispering of vowels and consonants is their most speedy and sure road to cure. The declaiming of whole passages in whisper will be found a most beneficial practice; all exercises in the chart are given for rendition in both forms.

THE TABLES.—The first does not call for special remark. Modulation upon one, two, three and four vowels will follow in their natural order. In the lower line of the second table the order of the letters is reversed within each group, so that in forming a syllable with any vowel you may begin with a thin and end with an aspirated consonant, pav, pof; or reversely, fib, vup. Difficulty in syllabic formation and enunciation has, generally I think, the following degrees: (1) repetition of the same consonant, pap, bab, faf; (2) a thin alternating with a medial, or a medial alternating with a thin consonant within its group, pav, bop; tod, dot; (3) composition of the aspirates with either of the other classes within the group, pev, vup; buv, vub; tuth, thut; duth, thud. The formation of syllables as between group and group, is comparatively easy, the greater interval, I presume, allowing freer play to the parts.

The third is an attempt at orthoepy. I have made use of the classification of vowels into long and short not because it is accurate, but because it is convenient. If a word such as pin be emphasized—as once in the House of Commons ‘call you that a pin?’—it will necessarily be long. I sometimes doubt that our prosody proceeds upon the order of the foot-rule. The intermediate which I call é (ei) is written indifferently, o, u, a, e, i, appears frequently in composition with r as or, ur, er, ir, but, so far as I can ascertain, scarcely admits of classification as long or short. According to its use it may be either or of indefinite length. O is that vowel-name which we have in common with European peoples. Its position in English is well defined, as in note, and we might have expected it to show marked varieties of length. But not so. Its short form has shot into intermediate ó, (awe) while the short sounds of other vowels have remained comparatively stable. One must go north of the Tweed, at least north of Mr. Oliphant's Great Sundering Line, before he reaches nŏht, pŏht, hŏht. The Scotch have preserved the old English vowel with very great exactness. I give no examples, long or short, of the intermediate ú (ou) for the reason already given. Its place is often supplied or usurped by the compound $\underset{\iota}{o}$ (ow) as rout, rowt; gouge, gowge. In these instances our pronunciation is not stable, while fine distinctions are not easily drawn in the case of low vowels. When U, disinterred from the rubbish that for nearly three centuries has lain upon it, shall have claimed and received fit recognition from our authorities, the position of the intermediate will become more clearly defined and be confounded neither on the one side with U (oo) nor on the other with $\underset{\iota}{o}$ (ow). In regard to the compounds $\underset{\iota}{u}$, $\underset{\iota}{i}$, $\underset{\iota}{oi}$, $\underset{\iota}{o}$, I find no short form of them and imagine that to be pronounced at all, which necessitates the passing from one vowel position to another, they must be sounded long.

One will see in scanning the table that the main difficulty in English orthoepy arises from the long and not from the short forms of vowels. Pin, bin, fin represent I (ee) faithfully, but to produce the same vowel long, we change the character, peel, heat, feel, except, in foreign words. Again for E we have an accurate short sound in pet, bet, fell, but for the long we write pay, bay, fey, or fay. The á (ah) is the most pronounced intermediate in English both long and short and was a particular favourite with Sheridan. It makes distressful havoc of the continental A, though we manage to obscure by out-heroding the outrage with our name-sound for the same character. The center of the vowel system A (aa) found its advocate in Walker. As early as the days of Chaucer it is represented by the letters au, but its native garb is by no means obliterated from our tongue. It appears in many words, in father, for instance. Its short sound constitutes the most unsatisfactory part of our orthography. Many dictionaries set it down as an obscure or obtuse form of the compound $\underset{\iota}{u}$ (you). I doubt whether any statement could be more obscure or more obtuse. If you lengthen the vowel in pun, you get the vowel in palm; shorten the first vowel sound of father and you have that of fun. The intermediate ó (awe) is well developed in both powers, and presents a striking contrast to O and U. Such has been the influence of our compound $\underset{\iota}{u}$, that the ancient English sound for the letter came to be written oo for the short as well as the long form, fŏot, pool. It is nevertheless found in its proper dress on composition with p, b, f, l, w and sh, pull, push. When one looks upon the printed English of to-day, he would not at first blush entertain the thought that the characters I, E, A, O, U, represented in old English the sounds which they represent in the chart, or that our fathers used them in the island of Britain for more than four hundred years, and attached to them the same powers which they now have in the best educated circles of Europe. Yet such is the incontestable fact.

In drawing up table III. I endeavoured to confine myself to monosyllables and words which are in frequent use and in its compilation have received much assistance from Mr. Hullah's work on the "Speaking Voice." I give but one example of each consonant except where there seemed strong reason to use a greater number, in the case of intermediate é and U. Had I allowed myself greater latitude I might have lengthened the table indefinitely. As it stands it falls much short of my wish. The difficulty of picking out monosyllables beginning with each consonant containing each vowel in cases where pronunciation is not open to serious question, must be my apology for its incompleteness. My endeavour has been and I hope the table on examination will be found to exemplify with a reasonable degree of fullness, the vowel and consonant sounds of English on a basis of pronunciation which is accepted by all standard authorities and is in use on both sides of the Atlantic.

I should add that the chart is copyrighted in the United States by Mr. L. W. Seely, in Canada by myself, and is submitted to the members of the Institute for their consideration, and in the hope of receiving such suggestions for its improvement as may occur to them, while the right of publication and translation is reserved.

CHART OF ELOCUTIONARY DRILL.

Designed for use in Private Study and in Schools and Colleges

T. B. BROWNING, M.A.

VOLUNTARY BREATHING.

I. Modes.

Thorassic.—From the shoulders as a fixed line alternately to elevate and depress the ribs to their full extent.

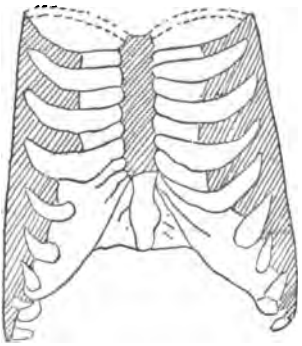


Fig. 1

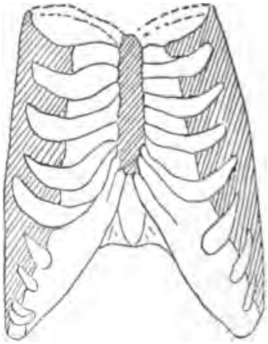


Fig. 2.

Production—the body erect, shoulders square to the front, the arms hanging by the side, nostrils dilated.

(1) *Full Inspiration.*—(*a*) Bend the fore-arm against the upper, placing the fingers on the shoulders; (*b*) raise the elbows obliquely outwards to the height of the shoulders; then (*c*) over the shoulders obliquely backwards, till the wrists cross at the nape of the neck.

(2) *Full Expiration.*—(*a*) From the last position bring the elbows obliquely outwards and downwards to the sides; (*b*) cross the wrists on the hollow of the chest, and (*c*) compress the ribs both in front and at the sides.

Exer. 1. Inhale in thorassic breathing, repeat.

2. DIAPHRAGMATIC.—From the ribs as fixed points to contract and relax, that is, depress and elevate the diaphragm alternately.

Production—the body erect, nostrils dilated.

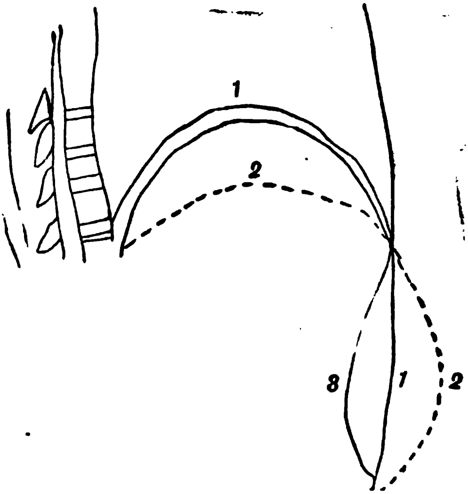


Fig. 3.

(1) *Full Inspiration.*—(*a*) Relax the front abdominal muscles; (*b*) depress the diaphragm. The dotted lines (2) indicate the position to be assumed.

(2) *Full Expiration.*—Contract the front abdominal muscles, pressing inwards (3) and upwards—diaphragm is driven to its normal position which is indicated in Fig. 3 by the continuous dark line (1).

Exer. 2.—Inhale in diaphragmatic breathing, repeat.

II. GOVERNMENT.

1. INHALING—*Ordinary.*—Receive the air through the nostrils and without noise. Place the tongue against the roof of the mouth, expand the nostrils and bring the organs to the position of full inspiration.

Impassioned.—Receive the air through the mouth and with sound, as in gasping.

Exer. 3.—Inhale in each kind alternately and in each mode.

2. RETAINING.—Maintain the position of full inspiration, close the glottis as in the act of swallowing, and keep it closed, shutting the air passage of the mouth and of the nose as far as possible.

Times.—(1) from $\frac{1}{10}''$ to $1''$;
(2) " 1 " 5, short;
(3) " 5 " 15, medial;
(4) " 15 " 45, long;
(5) " 45 " 60, very long.

Exer. 4.—Retain for each time inhaling as above, repeat.

3. EXHALING.—Assume the position of full expiration, emptying the lungs without noise;

(*a*) At a blow,

(*b*) Gradually, pouring forth the breath in an even stream for the times given under head of retaining.

Exer. 5.—Exhale for each time, repeat.

VOWEL SOUNDS.

I. PRIMARY.

448.	896.	1792.	3584.	7168.
U (oo)	O	A (aa)	E (ey)	I (ee).

Note.—The Primary vowels are a series of ascending octaves; the figures are the numbers of single vibrations which produce them; the diagrams are drawn for the lower register. Project all sounds to an object.

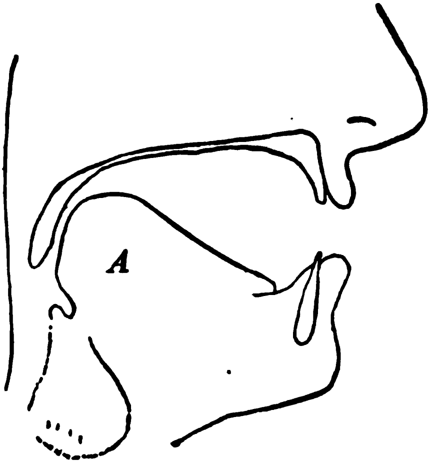


Fig. 4.

1. FORMATION.—Arch the back of the tongue against the uvula, its point resting on the floor of the mouth between the lower jaws, open the mouth fully and cover the teeth lightly with the lips.

Exer. 6.—Sound A exhaling in each time, repeat.

(2) CHARACTER.—(*a*) Atonic—non-vocal or whisper.
(*b*) Tonic—vocal or voice.

Exer. 7.—Sound A in each character for each time, repeat.

(3) REGISTER.— (*a*) Lower or orotund—depress the larynx and base of tongue raising the palate.
(*b*) Higher or conversational—larynx, tongue and palate in ordinary positions.

Exer. 8.—Sound A with each register and in each character for each time, repeat.

(4) **Description.** — (*a*) *Full*—convert all breathing force into sound, as in yawning.

(*b*) *Mixed*—convert part breathing force into sound as in panting.

Exer. 9.—Sound A in each description with each register in each character for each time, repeat.

2. MODULATION :

(1) **Pitch.**—Scale for pitch and inflection.

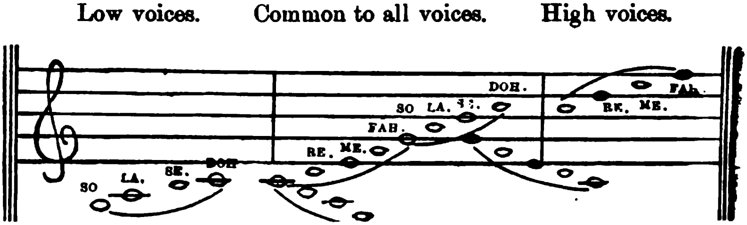


Fig. 5.

Each note is a pitch—principal pitches, doh, so, me (key c.).

Exer. 10.—Sound A in each pitch or principal pitch in each description, etc.

(2) **Inflection.** —Inflection is an union, coalescing or welding of notes.

(*a*) *Monotone.*—Notes repeated; doh, doh.

(*b*) *Rising.*—Sound continued from lower to higher pitch without break or distinction of notes; me-so.

(*c*) *Falling.*—Sound continued from higher to lower pitch without break or distinction of notes; so-me.

(*d*) *Circumflex.*—The combining of rising and falling inflections without break or distinction of notes; marks

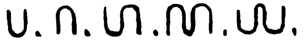


Fig. 6.

Exer. 11.—Sound A in each inflection at each principal pitch in each description, etc.

(3) **Force.**—(*a*) Very soft. (*c*) Moderate. (*e*) Very Loud.
(*b*) Soft. (*d*) Loud.

Exer. 12.—Sound A in each force with each inflection at each pitch in each description, etc.

(4) STRESS. Short. Long.

(*a*) *Minor* or *effusive*:

(*b*) *Radical* or *explosive*:

(*c*) *Median* or *swell*:

(*d*) *Terminal*:

(*e*) *Tremor*:

(*f*) *Thorough*:

(*g*) *Circumflex* or *radical and terminal stress combined*:

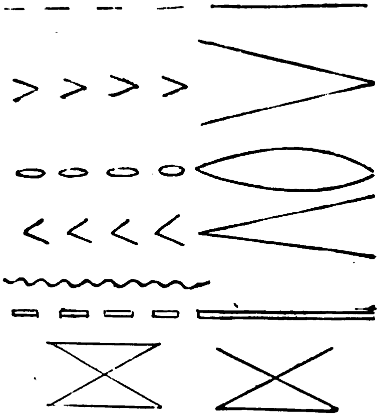


Fig. 7.

Exer. 13.—Sound A in each stress in each force at each pitch in each description, etc.

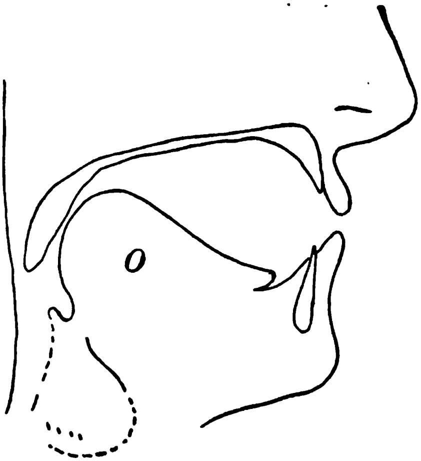


Fig. 8.

FORMATION.—Tongue and teeth in the A position, cheeks hollowed, lips drawn in, oral aperture almost circular, its diameters half those for A.

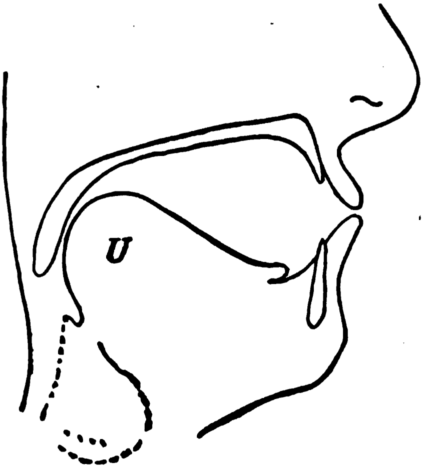


Fig. 9.

Tongue, teeth and cheeks in the O form, lips protruded, oral aperture reduced to half the size for O.

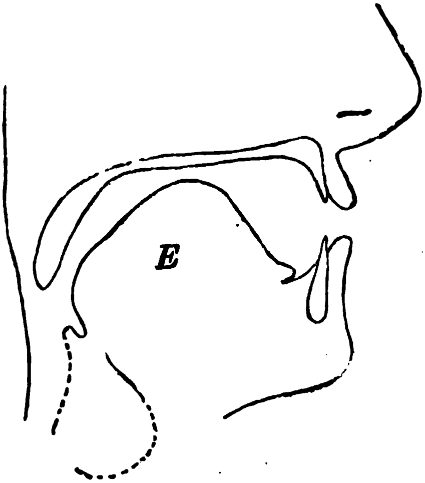


Fig. 10.

Place the tongue against the roof of the mouth, sink its fore-part near the mid-arch of the hard palate, so that its tip rests upon the floor; drop the lower jaw about ⅔ the distance for A and cover the teeth lightly with the lips.

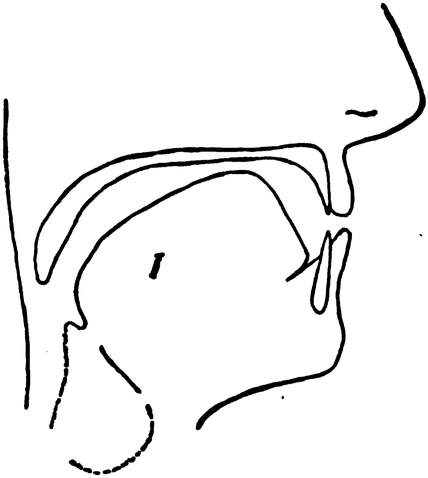


Fig. 11.

From the position for E move the tongue close to the front wall of the mouth, bring the teeth to about ½ the distance for E and draw the lips sharply over them.

Exer. 14.—Repeat exercises 6 to 13 for each primary.

INTERMEDIATES.—(1) é (ei) is intermediate between I and E, as in her.

(2) á (ah) is intermediate between E and A, as in man.

(3) ó (awe) is intermediate between A and O, as in form.

(4) ú (ou) is intermediate between O and U.

Exer. 15.—Repeat exercises 6 to 13 for each intermediate.

COMPOUNDS.—(1) o̦ (ow) is formed by coalescing A and U, as in how, house.

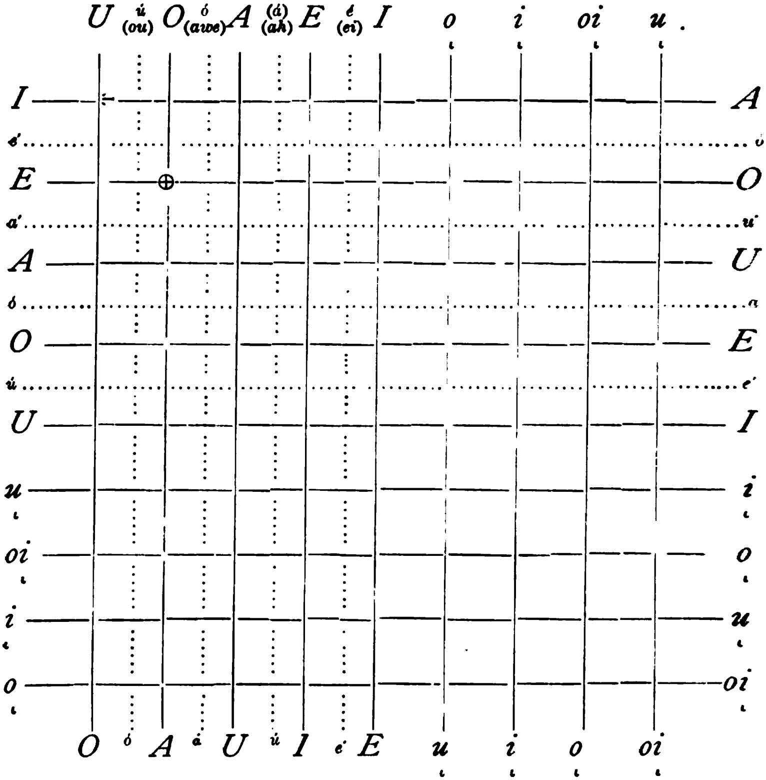
(2) i̦ (eye) is formed by coalescing A and I, as in pine.

(3) o̦i is formed by coalescing O and i̦, as in oil.

(4) u̦ (you) is formed by coalescing I and U as in tune.

Exer. 16.—Repeat exercises 6 to 13 for each compound.

TABLE I.—ARTICULATION OF VOWELS.



Note.—The primary vowels are placed on the leaded, the compounds on the hair, and the intermediates on the dotted lines. Hyphen is used between syllables.

(1) Groups of two vowels :

(*a*) Proceed on the lines from left to right and reversely, vowel on the left leading : I-U, I-O.

(*b*) Proceed from top to bottom and reversely, upper vowel leading : U-I, U-E.

Exer. 17.—Repeat exercises 6 to 13 for each group of two.

(2) Groups of three: Take the right angles : I-O-U, U-O-A, A-U-O, O-U-I.

Exer. 18.—Repeat exercises 6 to 13 for each group of three.

(3) Groups of four. Proceed on the perpendiculars each in turn leading: E-O-O-A, O-O-A-E, O-A-E-O, A-E-O-O.

Exer. 19.—Repeat exercises 6 to 13 for each group of four.

CONSONANT SOUNDS.

1. Formation.—Beginning at tip of lips for P., the consonant formation point moves backward to the base of the tongue and soft palate for the gutturals H and Y (old English). The vertical lines indicate that the lower letters have approximately the same formation points as the upper. The word sibilant shows the distinctive character of the letters so named. Of the liquids, m, n, ng, are nasal, the rest oral. L is formed by holding the point of the tongue on the D position, and driving the vocal current round it, that is between the upper and the lower jaws: drop the point of the tongue to form R. The regions of aspiration are the teeth and back of the mouth, in both of which places the R can be trilled. The figures show the medial positions for each group.

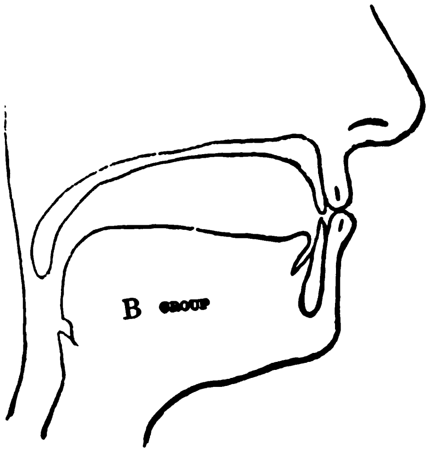


Fig. 12.

Labials or B Group.

		Thin.	Medial.	Aspirate	
Mutes.		P.	B.	F.	V.
Sibilants.		Ψ (ps)			
Liquids.	oral				
	Nasal.		m.		

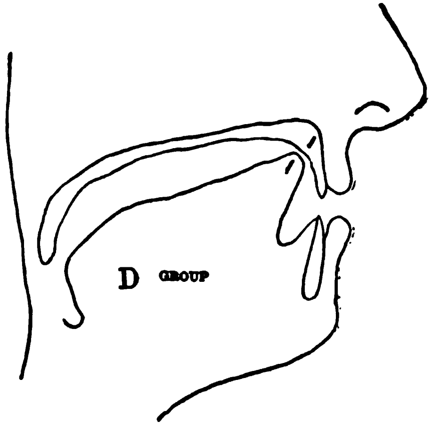


Fig. 13.
Dental or D Group.

Aspirate.		Medial.	Thin.
Th.	Th.	D.	T.
Zh.	Sh.	Z	S
J-(Dsh)ch-(Tsh)		L	R.(final)
		n.	

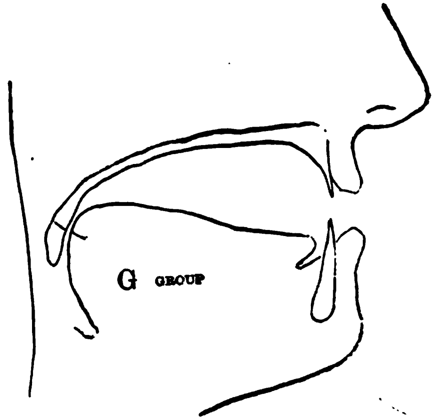
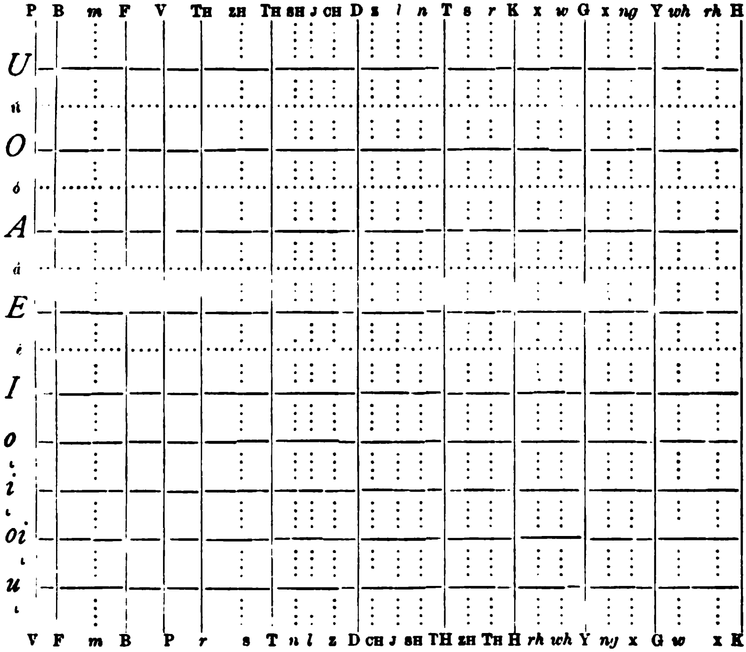


Fig. 14.
Guttural or G Group.

Thin.	Medial.	Aspirate.		
K.	G.	Y.	H.	12
X.	X.			8
				4
W.	N G.	Wh.	Rh.	3
				27

Table II.—Vowels and Consonants.

Note.—The liquids are in italics, the sibilants in small capitals, the mutes capitals; in the upper line the mutes are on the leaded, the sibilants on the hair, and the liquids on the dotted lines.


P B *m* F V TH ZH TH SH J CH D Z *l* *n* T S *r* K X *w* G X *ng* Y *wh* *rh* H
U
ŭ
O
ó
A
á
E
é
I
o
i
oi
u
V F *m* B P *r* S T *n* *l* Z D CH J SH TH ZH TH H *rh* *wh* Y *ng* X G *w* X K

(1) Formation.—(1) Groups of two.—Proceed with each vowel on the lines (*a*) from left to right and (*b*) reversely, the letters on the left leading: (*a*) U P.

Exer. 20.—Repeat exercises 6 to 13 for each group of two.

(2) Groups of three.—(*a*) Proceed from right to left, consonant leading and repeated, P U P.

(*b*) Proceed from right to left taking consonants in the following order, top and bottom, then reversely, bottom and top.

Exer. 21.—Repeat exercises 6 to 13 for each group of three.

2. Two Syllables:

(1) Formation.—(*a*) Duplicate exercise 20, first the vowel leading, next the consonant: UP,-PU.

(*b*) Repeat groups of three in exercise 21 (*a*);

(*c*) Combine two groups in exercise 21 (*b*).

Exer. 21.—Repeat exercises 6 to 13 for each group of two syllables.

TABLE III.

	I		*é*	*È*		*á*		*A*		*ó*		*O*	*ú*	*U*		*u̦*	*i̦*	*oi̦*	*o̦*
	short.	long.		short.	long.	short.	long.	short.	long.	short.	long.	long.		short.	long.				
P.	pin.	pique.	perch. perfume	pet.	pay.	pan.	past.	pun.	palm.	pot.	pall.	pole.		push. put. book.	pool.	pure. pew.	pine.	poise.	pout.
B.	bill.	beat.	birth. burn.	bet.	bay.	ban.	bask.	blood.	balm.	boss.	ball.	bowl.		bull. bush.	boom.	buhl.	by.	boy.	bout.
N.	nymph.	need.	nerve.	net.	nay.	gnat.	nasty.	nut.	aunt.	on knob.	knowledge. gnaw.	no.		nook.	noon.	new.	nigh.	noise.	now.
F.	fin.	fear.	fir fur.	fell.	fey.	fan.	fast.	fun. flood.	father.	fog.	fault.	foal.		full. foot.	fool.	fume. few.	fine.	foil.	fowl.
V.	vintage.	veer.	verb. verdict.	vex.	vein.	van.	vast.			volley.	vaunt.	vote.				view.	vie.	voice. void.	vow.
Th.	this.	thee.		them.	they.	than.	rather.	thus.		bother.		though			enthuse.		thy.		thou.
Zh.															azure.				
Th.	thin.	theme.	thirsty.	theft.	thane.	thank.	bath.	thunder			cloth. thaw.				through	thew.	thigh.		thousand.
Sh.	ship.	she.		shell.	shape.	shall.	shaft.	shut.		shod.	shawl.	show.		should. sugar.	shoe.		shy.		shower.
Ch.	chip.	cheer.	check.	chess.	chair.	chat.	enchant	chub.	chaldron.	chop.		choke.			choose.		chide.		pouch.
J.	gill.	jeer.	germ. jerk.	jess.	jail.	jam.		jut.	jaunt.	jot.	jaw.	joke.			jews.	huge.		join.	jowl.
D.	dim.	deal.	dirk.	dell.	dale.	dab.	draft.	does.	daunt.	dot.	dawn.	dome.			do.	dupe. dew.	die.	doit.	down.
Z.	zink.	zeal.		zest.	zany.	as.			huzza.			zone.			ooze.			toys.	house
M.	mid.	meed.	myrtle. merchant.	met.	may.	mat.	mask.	moth.	calm.	moth.	moss.	moan.			moon.	mute.	might. my.		mouthe.
T.	tiff.	teal.	terms. terse.	tell.	tale.	tack.	trance. task.	touch.	taunt.	top.	aught. taw.	tone.		took.	too.	tune.	tie.	toil. toy.	out. town.
S.	sink.	seal.	serpent.	set.	sane.	sad.	sand.	son.	salve.	sod.	saw.	soak.		sough. soot.	soot. soothe.		sight. size.	soil.	sow.
L.	lick.	lead.	learn.	led.	laid.	lap.	lamb.	love.	laugh.	lot.	law.	low.		aloof. look. lunatic.	loo.	lute.	aisle. lie.	oil. loyal.	loud.
Final. R.	ir-	ear.	earnest.	berry.	air.	par.	are.		far.	for.	war.	oar.			poor.		ire.		our.
W.	will women.	we.	worm.	wet.	way.	wag.		won.		was.	wall.	woke.		wool. wolf. woman. would. woof.			wire.		wow.

K.	Kill.	key.	kern.	ken.	kate.	cat.	cash.	come.		cot.	cost.	core.	could cook.	cooper.	curate.	kite.	coil.	cow.
X.	links. figs.	weeks. leagues.	xerxes.	vex. legs.	plagues.	backs. bags.	example			hogs.	hawks.	brogues			rebukes fugues.	likes.		
G.	gig.	gear.	guess.	get.	gate.	gammon	glass.	gun.	guards.	got.	gauze.	goat.	goorka. good.	groups.	gewgaw	guile.		gout.
Final. Ng.	sing.						sang.	sung.		long.								
Wh.	whit.	wheel.		whet.	whey.					what.		whoa.		whoop.		whine.		
Rh.	rick.	reek.	reck.	red.	rare.	raft.	rang.	run.		rock.		row.	rook.	rood. rude.		rhyme.	royal.	
Y and H		yield. he.	her.	yet. hen.	yea. hay.	yarn. hat.	hasp.		yard. half.	yon. hot.	yawn. haw.	yeoman whole.		who.	yule. hue.	high.	hoist.	house how.

ESKIMO OF HUDSON'S STRAIT.

BY F. F. PAYNE.

MUCH has been written of the Eskimo by navigators and travellers in Arctic and sub-Arctic Regions, and yet we find in almost every writing at least something new to interest us. In a short paper such as this it would be useless attempting to describe all the customs and habits common to the whole race that have so often been described before, I shall, therefore, endeavour to confine myself as much as possible to a description of the more interesting parts of the modes of life of those met with on the shores of Hudson's Strait, and more especially those at Cape Prince of Wales, many of whom had not met white men before, and with whom I lived during a period of thirteen months.

During the winter months the Eskimo, or Inuite as they call themselves, are found occupying the ground at prominent points along the the coast. Here the ever changing tides flowing and returning break up the ice and here the seals, on which they mainly subsist, are found. The prevailing winds during these months being from the north-west, snow is drifted to a great depth on the south-eastern sides of the hills. This they take advantage of and soon after building their igloos many of them are completely buried and are thereby well protected from the wind. On visiting a village after a snowstorm I was struck with its resemblance to a lot of mole hills. Nothing could be seen but a little snow thrown up on each side of a hole by which a passage led to the igloo ; on a near approach, however, windows were seen a little below the surface from which the snow had been removed. Upon entering some of those igloos, passage ways were found cut through the drifted snow thereby connecting several of them, making it appear much like an underground village.

In these villages they live as long as possible, and will not leave until they are compelled to do so through scarcity of food ; but at this time, when a report comes in from another part of the coast that seals are plentiful, they will sometimes leave in a body, and where an hour ago merry laughter could be heard, now you are only greeted with the snarl of a stray dog that keeps well out of your way, or the caw of a raven as it sits on a neighbouring rock watching you suspiciously.

About the month of March, most of the seals leaving the coast, food becomes very scarce and many shifts are made. Hurried expeditions are taken by the men with their dogs along the shore, their family sometimes accompanying them, but they are oftener left behind, and the unhappy look of a father as he returns without success tells plainly how much he feels for those dependent upon him.

As this month advanced at Cape Prince of Wales food became scarcer and now, though at other times helping one another, it was a matter with many of life and death and every man looked out for himself and his family. If he secured a seal it was hidden as quickly as possible. At this time the old and those weakened by starvation and unable to move from place to place were left to their fate, though should a party be so successful as to capture more than would supply their immediate wants they returned at once with food to those they had left behind.

Early in April, the weather becoming milder and the snow well packed sleigh journeys are made to distant parts of the coast and seldom before this time do they undertake long trips. At this time, too, the deer come from inland to the coast and expeditions are made to meet them, though few deer are taken until the end of the month.

The latter part of April, May, and June may be considered the Eskimo's harvest time, for besides the deer large numbers of seals are taken as they appear along the wide cracks that now form in the ice.

Towards the end of May, snow igloos melting away, the women may be seen busily engaged in repairing the seal skin covering of their tupeys which have been cached since the previous summer, and now, while some are inland hunting deer, single families pitch their tupeys at favourable places along the coast where the men spend most of the time watching the ice for seals.

On May 23rd, four families left Cape Prince of Wales for a large lake about one hundred and sixty miles to the southward. Here I was informed they would remain throughout the summer living upon deer, fish, and a kind of berry not found on the coast. This lake, by their own description, must be about one hundred and fifty miles in length, and twenty-five miles broad, and apparently has never been visited by civilized being.

Early in June all the hunters returned to the coast and immediately commenced laying in a stock of walrus and seal meat, which was cut into strips, sewn up in bags, made of the whole skin of a seal, and cached.

On June 10th the first kyaks of the season were launched at Cape Prince of Wales, and from this time until the end of August a sharp lookout was kept for the white whale which gives a large supply of food.

For the second time in the year the deer season commences about August 20th and lasts a month, during which time some exceedingly hard work is done to secure enough skins for clothing and bedding for the winter.

During the latter part of September and until the sea is once more covered with ice, about the end of November, walruses are hunted. After this date the kyaks are put away, and until the ice is firm the times are very hard; and now the caches are opened and a large hole is soon made in their small winter's stock of provisions. With empty stomachs and leaky wigwams they exist until the latter part of December, when once more they build snow igloos and winter life begins again in earnest.

Besides the walrus, deer, seal and whale we might include all mammals and birds found in this region as comprising the Eskimo's food supply, but as several are only eaten when they are starving we may consider the following as a complete list of articles of food upon which they subsist:—Bear, rabbit, fox, dog and lemming, duck, goose, loon, young birds of all kinds, eggs, three or four species of fish, clams, mussels, shrimps, crayfish, one species of algae, the flowers of two, the roots of two, and the berries of three different plants, besides the bark of the willow, large quantities of which are eaten in the spring.. The fox, dog, and lemming are only eaten in cases of extreme hunger, and the hardest to swallow seems to be the former, which even the Eskimo dog would not touch while scraps of dry seal skin were to be found. In eating any vegetable food they usually preferred to dip it into oil before swallowing. Quantities of seaweed are eaten especially during the winter months when other food is scarce, and this I am inclined to think was the cause of the illness of several children, all of whom were suffering great pain when little else was being eaten.

Cooked food is only partaken of as a change, though it might become more generally used if fuel was plentiful. It was very amusing to see them with old fruit cans boiling small pieces of seal or other meat over a fire of small weeds. It was usually eaten half cooked and thickly coated with ashes.

Apparently only two regular meals are eaten, one upon first rising in the morning and one just before retiring. At these meals they might be seen each with a knife of some kind sitting round a seal with their share, taking first a piece of lean and then a piece of fat as we would eat bread and cheese, and, as might be supposed, their faces did not present a very pretty appearance after these meals.

Much has been said of the Eskimo's improvidence and undoubtedly, like most civilized beings, when food is plentiful they do eat more than usual thereby becoming lazier and less inclined to hunt; but it may be said for the credit of those in Hudson's Strait, excepting a few, they would hunt and kill at almost any time, and not so much as a handful of food was ever wasted.

Of original genius they seemed to possess little for although many of their appliances for hunting and trapping are ingeniously made, these have all been copied from those used by the same race, we may say, centuries ago, and in proof of this statement it may be added that where simple repairs were needed in traps and other implements, and where parts of these had been lost they were quite incapable of employing other means to make them of service until shown by my men or myself.

A marked difference is noticed in the quality of all mechanical work done by the Eskimo of the north and south shores of the Strait, especially in clothes by the women, and hunting implements and carved work made by the men, those on the north shore doing far the neatest and best work. This may be owing to the great demand for these articles by the men of the whalers who are constantly bartering with them; while those to the southward never have a chance of doing so, and are content with more roughly made articles for their own use.

Occasionally one would be found who showed far greater genius than his fellows, and here we might instance a man named Cowktooian, who, by the way, had lived many years on the north shore. With the roughest tools he was seen to make some beautiful joints in wood work, and on one occasion undertook to make the nipple of a gun, his only tool being a file. He first filed a piece of steel to the requisite shape, and then grinding one point of the file to the proper size for a drill made a very neat hole through it. Now, however, he was quite unable to file a rough thread for the necessary screw and was obliged to appeal to one of my men for aid.

The Eskimo cannot be said to excel in the finer arts, and yet we find in them the inborn love of sketching and carving, only in the latter, however, are they at all proficient. Good models of kyaks, animals and birds in ivory are made especially on the north side of the strait, where they seem to delight in vying with one another in trying to make the smallest models. The art of drawing is confined almost altogether to describing figures on the level surface of the snow either with a piece of stick, or, in larger figures, with their feet, and in several instances most correct drawings of their own people were made by slowly moving along with feet close together, raising a low ridge of snow as an outline, and afterwards adding details most dexterously with one foot.

Perspective in drawing was a great mystery, and even those who had been able to look at pictures upon the wall of my house every day for a year could not understand it. Involuntarily their hands would steal up to the picture and slowly passing them over they would feel for the objects that stood out from the background, while others would shift their heads to look behind screens or doors in the picture.

Soon after our arrival at the Observatory a coloured life sized picture of a child was put up just over my bed, directly facing the window. It had not been there long when hearing a great commotion I went to see what was the matter and found half a dozen faces pressed against the window and all were calling "chimo, chimo," which is a kind of welcome, and nothing would persuade them it was not real life until they had been allowed to examine it closely.

I am now reminded of a similar incident with a crying doll, several of which I had brought up as presents for the children. A few days after my arrival, and while a woman and her child were looking in at the window I brought out one of these dolls, for the first time, and, unseen, dressed it in a towel, and slowly brought it towards the window. At first sight of it the woman's eyes opened very widely as she stood wondering, but when I suddenly made it squeak she did not wonder any more, but turned and fled.

Besides the means commonly employed in the chase by the Eskimo in all parts of the Arctic Regions there are doubtless others only known or practised by those living in certain localities. At Cape Prince of Wales the seals were seldom captured at their holes in the ice, but invariably along wide cracks, or in the water beyond the ice where one man might be often seen scraping with his spear and whistling in a low note while his companion lay at the edge of the ice, and if there were any seals within hearing distance they were always attracted to the spot, when rising quickly the Eskimo would throw his spear with line attached and if quick enough would seldom miss. The seal, however, is very active and often escapes by diving before the harpoon reaches it.

The gun, with which many are supplied, has almost taken the place of the bow and arrow, nevertheless they are still used by a few in deer hunting, and while one takes up a position behind some stones in one of the narrow passes of the hills others drive the deer towards him. By this means a very close shot is obtained and I was informed that often half the length of the arrow is buried in the deer's side.

The fish spear used in Greenland is also found here though seldom used, the most common implement employed being a long handle with an ordinary knife firmly tied near one end making a fork, one prong of which is the end of the rod, the other the blade of the knife its sharpened edge turned inward. With this ugly weapon the salmon are speared or, more properly speaking, are slashed and are often found nearly cut in halves.

The net is also used here in catching fish in the smaller streams, though the most common mode of trapping is by building walls of stones shaped like a bag about six inches above the surface, and then with sticks and stones splashing the water higher up the stream and driving the fish into the trap.

Some ingenuity is shown in setting the common steel fox-trap in winter. A wall of snow about eighteen inches high is built in the shape of half a circle the diameter of which is about two and a half feet. Near the centre from which the arc is drawn, the snow is first well pressed. A hole the shape of the trap is then dug with a knife and the trap being let into it, it is carefully covered with a thin crust of snow so that even if the fox does not actually tread upon the small pan, part of the crust when broken will start the trap. In front, and just under the wall small pieces of bait are placed so that in shifting its position to take each piece of bait the fox is certain to tread upon the trap.

The Eskimo's, amusements are few, and only in one or two do they seem to take much interest. Throwing the harpoon had the greatest attraction for the men, and often they might be seen taking their turns at a mark in the snow. Wrestling and running are occasionally indulged in, but the weaker side soon loses interest and gives in. Mr. Stupart informs me that while he was stationed here a large snow pleasure house was built, supported in its centre by a pillar of snow. The only game noticed, in which they took part in this house, was a kind of tilting, an ivory ring being suspended from the ceiling through which the men tried to put their spears as they walked quickly round the pillar.

During my stay here football was introduced, and in this they appear to take more interest than in any other game. The bladder of a walrus was well blown and then covered with leather making an excellent football, and it was a novel sight to see them playing. Men, women, aud children all took part in it, and no quarter was allowed. Here a woman carrying her child on her back might be seen running at full speed after the ball, and the next moment she might be seen lying at full length with her naked child floundering in the snow a few feet beyond her. A minute later the child would be again in its place and nearly choking with laughter she would be seen elbowing her way after the ball again.

Catching trout in the summer in the manner described affords great amusement to the children and wild with excitement they were often seen pursuing a poor unfortunate fish in a shallow stream. The boys also spend a great deal of time in making small spears and other implements of the chase, and practise with one another in throwing at a mark. Girls have their dolls and as with girls of civilized parents they delight in playing house; nor do they tire of this until they are married, for often groups of girls of all ages might be seen sitting in some sheltered spot in summer each having a house formed only of a ring of stones a few inches in diameter in which some short pieces of stick were lying while other pieces were propped upright. These pieces of stick represented people, and they were made to visit one another's houses while the owner kept up a continous flow of conversation for them.

Unlike the Indian the Eskimo is nearly always laughing, and even in times of great distress it is not hard to make them smile. On one occasion, with the intention of building a beacon in the shape of a man, I procured the assistance of an Eskimo, and cutting out the shape of a large head in wood I got my assistant to carry it to the hill upon which I proposed to build the beacon. Without asking a question he assisted me to build the man and place head and arms upon it, nor did he understand its meaning when a model of a gun was placed between the arms. Finished it stood about nine feet high and when the last stone was put up I led my assistant about a hundred yards away and then turned him round to look at it. Slowly his eyes opened widely, and then suddenly he burst into such a fit of laughter I was almost afraid of him for he rolled upon the ground. This beacon was built for the guidance of the relief ship.

As we find among civilized beings men much more conversant with nature than their fellows so we find it with the Eskimo, and while some know many of the stars, and other objects in the heavens by name, others can hardly tell one from another. On the whole, however they may be said to be keen observers of nature, for in making collections of the birds, insects, and plants they were of great assistance, and if an insect was shown them they could usually take me where more of the same species might be found.

On the approach of summer they watched with interest its signs, and often would bring to me insects which they believed were the first of the season. The first snow bunting that appeared in the spring was hailed with great joy, and in great haste they came to inform me of its arrival.

Trading with one another and with those at distant parts of the coast is a common practice, the money standard used being a white fox skin. Most of their furs however are sent by one or two trusted traders to Captain Spicer's post on the north side of the strait and to the Hudson's Bay Company's post at Fort Chimo, Ungava Bay, and it is remarkable that, although these traders carry as many as thirty or forty parcels of furs owned by different families, they seemed quite able to remember on their return, to whom the goods they obtained in exchange belonged, apparently the only note made being a few marks with their teeth upon some of the articles.

It is generally supposed that the Indians and the Eskimo are continually at enmity with one another. This may be the case on the most northern coast of America, but it is certainly not so with those living on either the Labrador coast or Hudson's Strait, all of whom spoke in the highest terms of the Indian, or Udler, as they call them, and several Eskimo were wearing articles they had purchased from them when visiting Fort Chimo.

As it is the case with all, or most uncivilized races, many of the senses are not well developed in the Eskimo. Pain, for instance, under which we would groan is borne without flinching and in this we had ample means of judging as I was called in to dress several painful wounds. Deep cuts, too, made by the accidental slip of a knife were simply bound up with a piece of sinew and no further notice taken of them.

Their power of hearing is very good and it was often noticed that sounds at a distance unheard by ourselves could be distinctly heard by them.

Although many suffer with weak eyes their sight is wonderfully keen, especially at long distances, as was often noticed by their being able to count the seals upon the ice that appeared to us as small specks seen very indistinctly. As the winter advanced many of them became snow blind and all were affected more or less with the glitter of the sun upon the snow. In one house visited three children were found perfectly blind, and although we did all we could for them, they did not recover their sight for nearly twenty days.

Regarding their sense of taste we need only remark, there was nothing we would eat that they could not relish, and much more we would not eat they almost wholly subsisted upon. Smoking they dearly love, and the smallest scrap of tobacco is never wasted, even the ash from their pipes is used as snuff, and the idea of expectorating when chewing tobacco is never thought of; and further, disgusting though it is, the straw used in cleaning their pipe is always passed between their lips after each cleaning.

√ Although the Eskimo are cool under ordinary circumstances they become extremely nervous under excitement, and at times were seen trembling violently. This was noticed more especially when a walrus had been killed, and others were in sight, when playing a game of cards, and when leaving hurriedly for another part of the coast where seals had been reported.

Cleanliness, it may be said, is hardly known to the Eskimo uninfluenced by civilization, for to them apparently everything on earth is clean; nevertheless they would undoubtedly be glad to keep the dirt or dust off their bodies if they possessed such things as soap, towels, and water at a temperature rather higher than the freezing point, or we might say water at any temperature during the winter, for then it is as much as they can do to melt enough snow for drinking. During the warmest weather there was nothing they delighted in more than washing their faces when we would give them soap, and it was amusing to see them returning from a neighbouring stream laughing as they showed their faces to one another.

It is needless to repeat that the Eskimo will steal, for it is a well established fact, yet it is interesting to note some of its effects. Generally speaking all excepting the thief seemed to look upon the act as a great joke when it did not affect themselves, and as far as could be seen it is only fear that keeps them from stealing more from one another. Repeatedly we were asked to guard their goods while they made a journey, and every means possible are used to hide their caches. If during hard times an Eskimo discovers a cache his friends think it a great joke and all join in helping him devour its contents. At the same time the thief stands a chance of being punished by the owner.

During times when food was scarce they seemed to become careless and would then steal anything, and at one time some daring attempts at a raid upon my storehouse were made. In spite of a watch being kept, and a warning issued to them that those attempting to force an entrance would stand a chance of being shot, while going my rounds about midnight I was startled to see a number rush out of the building with their hands full of provisions. They had pried the door off the hinges as noiselessly as any professional housebreaker, and now they made off as hard as possible. Determined to frighten them I started in hot pursuit, and when a short distance from them fired several shots over their heads. For some time after this they prowled about at night, and Ugaluk my favourite Eskimo strongly advised us to always go out armed as several threats had been made by his people to fire upon us if we thwarted them again. No further attempts, however, were made and I feel confident it was the bold front we showed that induced them to reconsider their threats.

Among those living at Cape Prince of Wales were three desperate characters who, some years ago, attacked part of the shipwrecked crew of a whaler named "Kitty" while they slept in a tent on the shore not far from the observatory. At first they treated them well, often bringing them food, but their blankets and guns were too great a temptation, and with knives they despatched them all, excepting one poor fellow whose feet had been badly frozen. This man, strange to say, they took care of and Ugaluk my informant said he lived with him in his father's igloo during the winter, that both his feet came off, and he died in the following spring. In the fray one Eskimo was shot dead, the rest escaping without a wound.

Either from fear or seeking favour several Eskimo returned stolen goods, but in each case they requested payment and were most indignant when we refused to give them anything, Our best friend in this way was a good looking girl name Checkooaloo who acted as our detective and very often brought back articles stolen by her people.

Physically the Eskimo do not seem as strong as civilized beings for in many trials of strength with my men who were not above the average in muscle development they were quite unable to cope with them.

In speaking of the moral side of the Eskimo's character it is needless to repeat the many disgusting stories that have been told so often. It is sufficient to know that according to our standard of morality they are immoral, but from what we know of other races we must admit that they at least are comparatively virtuous savages. Even our morality in which we boast seems to have the effect of corrupting what little virtue the savage possesses when it comes in contact with him and we may say, nowhere is this so distinctly seen as among the Eskimo. On the north side of the strait where vessels often call on their way to and from Hudson's Bay exchange of wives is sometimes practised, while on the south side, where there is little or no intercourse with these vessels, such a thing was never heard of, and it is well known to those interested that sailors who were allowed to act much as they liked on the north side were met with virtuous scorn by those living on the south shore.

At Cape Prince of Wales a few Eskimo had three wives, several had two, but the greater number by far had only one, and there were several old bachelors.

In nearly all cases the best hunters have the most wives, and a widow who is the strongest and best worker stands the best chance of marrying again if she is so disposed, especially if she has sons, for they are considered a source of strength to a household while daughters are looked upon as a weakness.

Although in most cases a second wife is taken through affection for her, in many instances it is undoubtedly done in charity, and there is one peculiar law or custom among those met with in the Strait that may be worth relating. If a married Eskimo has been considered only worthy of death for some offence the man who undertakes to execute him becomes responsible for his wife and children. The woman becomes the wife of the murderer, and her children are treated with kindness by him. Two instances of this strange custom came under my notice, one of which was that of my favourite Ugaluk who informed me that some years ago there lived a bad Eskimo who would not work, but stole from everybody, and he undertook to do away with him. While in friendly conversation he stabbed him and carrying his body out on his kyak dropped it into the sea. His wife and three children now live with Ugaluk, and although she stands in his estimation as second to his first wife she appears to be quite happy, and during our stay here gave birth to her third child. A similar instance was met with at Cape Chudleigh, and in each case it seemed to be understood that those who were benefited by the death of these worthless fellows should give the executioner some assistance in supporting his family.

One man who had three wives, I was informed by Ugaluk, would have been content with one, but having no family he had married a second and a third, and now, poor miserable wretch, he was hardly able to support one, and all were childless.

Undoubtedly some of the matches between the sexes are arranged by the parents when their children are very young, nevertheless there was a good deal of love making. This was especially noticeable in the early summer when they were often seen together, and apparently without asking leave of anybody several started their own igloos. Much, however, as we dislike to think of it, it must be said, their love is little more than that of the birds of the air, excepting in constancy. Affection for one another they have, but such a thing as secrecy in any of the many phases of love is hardly thought of.

As far as could be seen no such thing as a marriage ceremony is performed. Girls marry at sixteen and even earlier, and when two are agreed they can be happy together, they either start their own igloo or the bride is received into the house of her husband's family and there they might be seen, husbands and wives, brothers and sisters all living happily together in one room or igloo.

The affection existing between parent and child is of the roughest kind, and is very interesting to watch. Little display is noticeable, and yet there appears to be intense earnestness in looking after the child's welfare, while the child is a pattern of obedience to its parents. The affection between husband and wife is much the same, but rapidly wanes if one becomes useless in the support of the other.

Partly in natural affection and partly from selfish motives all help one another, but it is a mistake to suppose that when a hunter returns with success he immediately shares his catch with his neighbours, for some were always found richer in food and household goods than others. The men in these wealthy families, as might be supposed, were either physically stronger or better hunters than their fellows.

Very few Eskimo who had become useless by age or accident were met with and those that were seen appeared to be a great burden upon their people, and although they were treated with great kindness while food was plentiful it required no great prophet to predict their death by starvation at any time when food was scarce.

Early in spring, when for many days we had not been visited by an Eskimo, and supposing they had left this part of the coast, I wandered over to a deserted village and entering an igloo was surprised to find an old woman and her son apparently dying from starvation, and from them learned that a crippled man and his child were in the same condition in another igloo near by. Here was a worse case than the first, for with a little strengthening food we were enabled to move the woman and her son to an igloo near the station, but the man was too far gone, nor would he allow his child to be taken from him. Each day food, and a large piece of snow was put by his side, and although unable to use his arms, his child, a little girl three years old, fed him. Days went by and little improvement could be noticed in his condition, and one afternoon when it had been thawing I walked over to the igloo. Calling as usual as I approached, I received no answer, and coming nearer found the roof of the igloo had fallen in, and there he lay with marbled face, his eyes now fixed and turned to space, and his child lay sleeping by him. Wrapped in his bedding we placed the body between a crevice in the rock and covered it with stones, this being the usual mode of burial with the Eskimo. The child was given in charge of the woman and son, and for some time all were dependent upon us for food. Through neglect the child soon died, and this recalls to my mind a sad scene, but it is needless to relate it here.

Eskimo opinions upon theological questions are not easily obtained and undoubtedly their faith in all their beliefs is extremely weak, for when asked to explain they would laugh and would tell you they only performed any of their rites because other Eskimo did so. Another difficulty to contend with is their extreme shyness or fear of being laughed at, for on this point they are most sensitive.

As far as could be learned they believe in a supreme spirit who rules over the earth and sky, and some minor spirits who rule the tides and other changes in nature, with whom their Angekok has power to converse.

Of a future life they believed in a heaven and a hell, the former to be a place where those go who do not lie and are good. This place is southward where the sky and earth meet, where there is no snow, plenty to eat, and no work to be done. Hell is a place where the wicked go especially those who have told lies and have done wrong to their fellows. Here it is always snowing, is very cold, and those that go there have to work as they did upon this earth.

The Angekok is only a man or woman rather shrewder than their fellows who exhorts the spirits to do whatever the people want, for which service they are paid. They are treated with little or no deference by their people excepting at times when they are employed. An Angekok, who often tried to make me believe he was better than his people, was entrapped by the rising tide one day while gathering seaweed, and in spite of his influence with the spirits the tide continued to rise driving him back under a steep ice cliff, and being unable to scale it he perished miserably.

During my stay in the Strait they were never seen praying but Ugaluk who often saw us at our prayers when told to whom we were praying said his people did the same.

One of their most interesting and peculiar religious customs is the offering of food and other things to the spirits. By the graves of many of their dead were found scraps of food, tobacco, powder, shot and other articles and at first it was supposed that these were offered only to those who had died. To my surprise, however, a number of like articles were found upon the beacon we had built in the shape of a man. Still more surprising was the fact that when we found two cannons upon the shore near Cape Prince of Wales, that had undoubtedly been left by some of the early explorers, and standing them on end a quantity of bullets, shot, and other rubbish rolled out. On enquiry as to how this had got there I was informed it had been given as an offering to the spirits.

Amulets though believed in are not much used, and only one Inuit was seen wearing one. This was Checkooaloo a sister of Ugaluk's who had a small piece of carved wood firmly sewn to her dress, and the only answer we could get from her as to its use was: she would "be no good" if she lost it. A similar piece of wood was found carefully protected with stones by the side of a grave.

Here, as elsewhere, the Eskimo take two days rest after killing a walrus, and become very indignant if asked to do work during this time.

During the walrus season they will not put needle into deer skin and, although often pressed, nothing would induce them to do so. Nor will they sew anything when one of the family is ill.

When a seal is killed a little fresh water is sprinkled over it before it is cut up, this custom, however, they would not always carry out, and if done in our presence would explain with a look of bashfulness that other Inuite always did so.

Walking along the shore near low tide mark with some young Eskimo who were gathering shellfish, I was surprised to find one of the young women would not pick any of them up although I had often seen her do so before. Nothing would induce her to touch them for she said she would be "no good" if she did so for a few days.

The graves of the Eskimo are found everywhere along the coast, some well built over with stones while others only show where the body was laid, the bones being scattered in every direction. The favorite place of burial is an island where the foxes and wolves cannot get at the bodies, and near Cape Prince of Wales an island, about ten acres in area, was seen literally covered with graves; and monuments ten feet high were erected here and there throughout it. These were evidently built for service in common, and like our beacon were covered with scraps of food.

Many other religious customs common to the race were noticed, but as nothing dissimilar was seen in them it is needless to relate them as they have often been told before.

Although Mr. Rink has shewn the Eskimo are rich in legendry, only one legend that was at all connected could be understood by ourselves. This was told by Ugaluk, and ran as follows: Not many years ago there lived a Cubloonack, or whiteman, on the eastern shore of Hudson's Bay where there were lots of Inuite and a few Udlers, or Indians. This Cubloonack was a very bad man, and used to speak to a lot of them, and taught them to sing different songs. One day an Udler came into the village and the Cubloonack caught him and calling all the Inuite about him he tied the Udler to a stake, and piling weeds and brush about it burned him alive. Nearly every day he used to walk up a hill by a circuitous path and as he walked he sang songs, all the Eskimos following in procession and when they reached the top of the hill he would talk to them about the sky. One day when the procession had gone up half way the Inuite refused to go any further so the Cubloonack went on alone, and he was never seen again, but they were sure he went up to the sky.

It is to be regretted that owing to our time being taken up with other matters while in the Strait little can be added to our present knowledge of the language; it may be worth noting, however, that although there is so little communication between the north and south shore of the Strait there is greater similarity in the pronunciation than there is between those living at Cape Prince of Wales and Cape Chudleigh. The chief difference in all cases being the use or disuse of the final sound of k which is one of the main characteristics of the Eskimo language. As for instance at North Bluff the Eskimo say nannoo (bear) whilst at Cape Prince of Wales it is pronounced nannook.

Wonderful though it is that the language remains so intact, it does not seem to be generally known what communication there is between the Eskimo at one place and those at a distant part of the coast. Regarding this I can only instance the case of one man who, with his family, I met at Cape Prince of Wales. This man not long ago, had lived far up Fox Channel and had crossed the Strait with a number of others in an omiak or large seal skin boat. Another man who lived nearly two hundred miles to the westward made the journey four times in the spring of 1886 travelling nearly eight hundred miles with his wife and child, It is a common thing to run down to Fort Chimo a distance, there and return, of six hundred miles and a brother of my favorite Eskimo Ugaluk returned in ten days as I received a dated letter written on the day he started.

In conclusion we may add that in spite of many revolting customs of the Eskimo, after living with them for some time we are forced to conclude that a civilized being transported to these regions and living under the same circumstances would soon adopt much the same mode of life. Remembering this and considering many fine traits in their character, savages though they are, we cannot help looking upon them as fellow beings in the same race for life, and consequently loving them.

THE BLACKFOOT SUN-DANCE.

BY REV. JOHN M'LEAN, M.A., BLOOD RESERVE, ALBERTA.

The most important sacred festival of the Blackfeet is the Sun-Dance. In the native language it is called Okán, a word whose meaning is now entirely lost. It is known amongst the white people as the Medicine-Dance or Sun-Dance. This arises from the fact that Natos, *the sun*, when combined with other words is also translated *medicine*, referring to the spiritual ceremonies of the medical priesthood. In the native religion of the Indians its true signification is *holy* or *divine*. As examples of these distinctions we have, Natosaumûqka, medicine-runner, Natoapsĭnaksĭn, the divine book, the sun-book, the Bible, Natoyetcĭstcĭkwĕ, the holy day—the sun-day —the Sabbath.

As these Indians have borrowed some of their ceremonies from the Sioux Indians, and the natives of Yucatan still hold the religious festival of the Sun-Dance, it may have happened that in the dim past they adopted this festival and modified it to suit themselves. A festival of nearly similar import is celebrated amongst the Crees named the Thirst-Dance. The records of tradition state that an old woman had a sick child which she loved tenderly. In her anxiety for its recovery, she prayed incessantly to Natos for help in her distress. One evening as she slept, Natos appeared to her in a dream, and told her that if she would build a Sun-lodge and make sacrifices to him, the child would get well. She awoke, and told her people of the wonderful vision, the lodge was erected, the festival was held, and the child recovered. Since that period, the Sun-Dance has been annually held. The time for the celebration of this festival is when the wild-fruit is ripe, at the end of July or early in August. Seven days is the length of time it is generally held, although this is sometimes shortened. The object of this festival is twofold, namely: military and religious. It is chiefly a sacred assembly, and constitutes a part of their native religious system. A virtuous woman of the tribe during the year has passed through some trying ordeal, and in accordance with her religious ideas and desires, has prayed to Natos for health for herself or some of her relations, and has vowed to Natos, that if her prayers are answered, she will become responsible for the annual celebration of the Sun-Dance.

The announcement having been made, the young men repair to the woods to procure the necessary materials to build the lodge. When it is cut, lariats are fastened around it, and it is dragged along the ground to its destination by young men on horseback, amid the exultations of their comrades, who as they ride singing and shouting, shoot incessantly with their guns into the logs. A level piece of ground is selected near the middle of the camp and the erection of the lodge is joyfully undertaken. The lodge is circular in form and of various dimensions. Those that I have seen among the Blood Indians were about thirty feet in diameter. In the centre stands the sacred pole from the top of which, heavy ridge poles extend to the sides, which are about five feet in height, strong supports are placed around the sides, the spaces intervening being filled with light brushwood. There is a large main entrance and a lesser one. Opposite the m in entrance and against the side of the lodge is the bower for the woman and her husband who have undertaken the celebration of the festival. At the foot of the sacred pole burns the sacred fire. At the left of the bower facing the main entrance a band of young men sit beating on drums as an accompaniment of the ceremonies, in the centre sit the chiefs near the sacred pole, and all around the sides the general assemblage is arranged as participants in the rites or merely as onlookers of a strange scene of a decaying religion and civilization. In the interests of science I have attended four Sun-Dances and taken extensive notes of all I saw, and a description of one of these will illustrate the prevailing ideas of the Indians. As the influences of religion and civilization are slowly undermining the native religious system, in a few years the celebration of this festival will become a thing of the past, and the opportunity for recording these religious customs will be gone.

On a warm day in the latter part of July, I visited the Blood Indian camp, and found the Sun-lodge as already described. There were by actual count one hundred and ninety-eight lodges, comprising about two thousand souls. An old man was riding through the camp calling upon the people to attend the ceremonies. In a lodge near at hand, a medicine man was decorating the persons who were to undergo the rite of torture. I noticed that in arranging the head-dress, before placing it on the head of each individual he passed his hand around it four times as he prayed. This was peculiarly significant, as it showed that these people in common with the Sioux and many other Indians regard the number four as a sacred number. This can be easily traced through their mythology, religious, social and political customs. In the Sun-lodge the sacred fire was burning, and this was used by the people for lighting their pipes. No child or woman was allowed to supply the fuel, but young men who had performed some valorous deed, especially the stealing of horses from a hostile tribe felt it to be an honor to attend to this duty, and none but the brave were qualified for this work. On the sacred pole was placed in the form of a cross X two bundles of small brushwood taken from the birch-tree. The pole was decorated with sacrifices of clothing and various kinds of Indian goods to Natos. The cross evidently refers to the four winds, from its four points, and is not borrowed from the Christian religion, as these people used this symbol before they came in contact with the white men, or had any knowledge of Christianity, besides being very superstitious about adopting any of the rites or symbols of the religion of the pale-face, and incorporating it with their own. In the bower made of light brushwood sat the woman who organized the lodge, her husband and a medicine man. These persons were fasting and praying, and during the full term of the continuance of the ceremonies, very little food was partaken. In the mornings they were allowed a short smoke, and a little water, and in the evenings a few of their friends brought a small quantity of food hidden under their blankets, and without exposing it to view, it was eaten in silence. The medicine man had a crown of leaves upon his head, his body painted, and without any clothing, save a long strip around his loins. At short intervals he arose and danced keeping time to the motions of his body, with a small bone whistle, which he blew upon incessantly, producing a series of monotonous sounds. In the evening the woman prayed to Natos for good health for the people, protection in danger, good crops and a bountiful harvest of wild fruits. The virgins came in the evening and prayed for a long time for blessings from Natos. During the day, the ceremonies consisted of dramatic representations of heroic adventures by single individuals, and contests with the Crow and Sioux Indians by war-parties. One chief borrowed several guns from his friends, and a large number of Indian war implements and native trinkets. Stepping forward that all the people might see him, amid profound silence, he addressed the assemblage. Holding a gun aloft he told how in a contest with an enemy, he had slain him and taken his gun. The band of musicians beat on their *tom-toms* in token of applause. Each article that he had, represented his various victories, and each had its separate story, which was narrated as the first, and the same routine gone through. When he had finished, the whole assemblage joined the musicians in applauding the speaker. Many warriors during the day related their brave deeds in the same manner.

Sham fights were engaged in, which were representations of actual battles. Five or six warriors appeared as Crow Indians and the same or a less number were the Blood Indian warriors. A single horse represented that they had been on horseback, and this was decked in its war-paint. One of the men, the hero of the battle, acted as instructor of the ceremonies to the others. Four times they entered the lodge, and then the fight began. They fired their guns over the heads of the people, the Crow Indians fell one by one, and when they had been scalped amid the laughter and applause of the audience, the scene was at an end. Berries cooked in fat were brought in by the women in pails and pots, and for a short time eating, smoking and conversation were the duties of the hour. Occasionally some old lady would call out the name of a young man, and declare his noble qualities before the people, and another would urge the young men to emulate the heroic deeds of their fathers and go to war.

Presents of bracelets, finger-rings and ear-rings were made to some of the women. The chief warrior carried in his hand the sacred pipe, which he first held aloft with the stem toward the Sun, that Natos might have the first-fruits of everything, and still holding it, stem toward the chiefs, each was allowed to take a smoke. The pipe was beautifully ornamented, and was used only at the Sun-Dance. Some of these pipes are of great value, the one which I saw costing fifteen of the best horses in the tribe, and these were used for hunting the buffalo. The women have one important ceremony to perform, namely: the preparation of the tongues. In former years when buffalo were in abundance as many as two thousand buffalo tongues were used at a single Sun-Dance ; now, the Indians have to be contented with two hundred tongues of domestic cattle. These are slightly boiled and dried, cut in slices very carefully, taken in sacks to the Sun-lodge and guarded by two young men. This rite partakes of the nature of a sacrament. None but virtuous women are allowed to go up and take a piece of tongue. After the persons devoted to Natos partake, the tongues are distributed amongst the people, as a religious ceremony.

As I stood outside the lodge, a young Indian friend of mine, went to an old medicine-woman and presented his sacrifice to Natos. During the year he had gone on a horse-stealing expedition and as is customary on such occasions had prayed to Natos for protection and success, offering himself to his god if his prayers were answered. He had been successful and he now presented himself as a sacrifice. The old woman took his hand held it toward the Sun and prayed, then laying a finger on a block of wood she severed it with one blow from a knife and deer's horn scraper. She held the portion of the finger cut off toward the Sun and dedicated that to him as the young man's sacrifice. The chief attraction to the pale-face is what has been ignorantly termed "making braves." I desired very much to see this ceremony *once*, that I might know the facts from personal observation, and draw my own conclusions after conversing with the Indians.

Two young men having their whole bodies painted, wearing the loin-cloth only, and with wreaths of leaves around their heads, ankles and wrists, stepped into the centre of the lodge. A blanket and a pillow were laid on the ground, and one of the young men stretched himself upon them. As he lay, an old man came forward and stood over him and then in an earnest speech told the people of the brave deeds, and noble heart of the young man. In the enumeration of his virtues and noble deeds, after each separate statement the musicians beat applause. When the aged orator ceased, the young man arose, placed his hands upon the old man's shoulders, and drew them downward, as a sign of gratitude for the favorable things said about him. He lay down, and four men held him while a fifth made the incisions in his breast and back. Two places were marked in each breast denoting the position and width of each incision. This being done, the wooden skewers being in readiness, a double edged knife was held in the hand, the point touching the flesh, a small piece of wood was placed on the under side to receive the point of the knife when it had gone through, and the flesh was drawn out the desired length for the knife to pierce. A quick pressure and the incision was made, the piece of wood was removed, and the skewer inserted from the under-side as the knife was being taken out. When the skewer was properly inserted, it was beaten down with the palm of the hand of the operator, that it might remain firmly in its place. This being done to each breast, with a single skewer for each, strong enough to tear away the flesh, and long enough to hold the lariats fastened to the top of the sacred pole, a double incision was made on the back of the left shoulder, to the skewer of which was fastened an Indian drum. The work being pronounced good by the persons engaged in the operation, the young man arose, and one of the operators fastened the lariats giving them two or three jerks to bring them into position.

The young man went up to the sacred pole, and while his countenance was exceedingly pale, and his frame trembling with emotion, threw his arms around it, and prayed earnestly for strength to pass successfully through the trying ordeal. His prayer ended he moved backward until the flesh was fully extended, and placing a small bone whistle in his mouth, he blew continuously upon it a series of short sharp sounds, while he threw himself backward, and danced until the flesh gave way and he fell. Previous to his tearing himself free from the lariats, he seized the drum with both hands and with a sudden pull tore the flesh on his back, dashing the drum to the ground amid the applause of the people. As he lay on the ground, the operators examined his wounds, cut off the flesh that was hanging loosely, and the ceremony was at an end. In former years the head of a buffalo was fastened by a rope to the back of the person undergoing the feat of self-immolation, but now a drum is used for that purpose.

From two to five persons undergo this torture every Sun-Dance. Its object is military and religious. It admits the young man into the noble band of warriors, whereby he gains the esteem of his fellows, and opens up the path to fortune and fame. But it is chiefly a religious rite. In a time of sickness, or danger, or in starting upon some dangerous expedition, the young man prays to Natos for help, and promises to give himself to Natos if his prayers are answered. Upon his return, when the Annual Sun-Dance is held, he fulfils his vow, gives himself to his god, and thus performs a twofold duty. Of course the applause of the people and the exhibition of courage are important factors in this rite, but its chief feature is a religious one. Instead of being a time of feasting and pleasure, the Sun-Dance is a military and religious festival, in connection with which there are occasions for joy, and the feast enhances the pleasure.

It is impossible to obtain accurately the interpretation of the Sun-lodge ceremonies without a knowledge of the language, as the speeches made explain much that would otherwise be misunderstood. Oftentimes the entire assemblage will burst forth in songs of thanksgiving, and again a famous warrior will sing aloud the praises of a young man or some brave kinsman who merits the plaudits of his tribe. This is a kind of chant in which the name and noble deeds are spoken of, and a tune accompanies or follows the oration.

Prayer is made to Natos only, and everything in Okán is sacred to him. The influence of this festival upon the hearts of the people is such that it keeps alive their native religion, and excites their passion for military glory.

PECULIARITIES AND EXTERNAL RELATIONS OF THE GAELIC LANGUAGE.

BY DAVID SPENCE.

It is remarkable that for more than a thousand years, the Saxon and the Kelt should have lived together in the same islands with scarcely any accurate knowledge of each other's institutions—still less of each other's language. This fact appears still more remarkable when we consider that in some places the races are separated by small mountain ranges only, in some by streams, and in others by imaginary lines, English being spoken on the one side, and Gaelic on the other. Till very recently there has been scarcely an instance of a Saxon whose curiosity has been excited to know something about the language of the people to the north and west of him. It has been generally treated as a mere jargon, unworthy the serious attention of any man of sense. I shall try to shew, as briefly as possible, that it is one of the most important branches of the old Aryan speech, and nearer the old forms than any other European language. It has a great deal in common with English, although this does not appear on the surface. In using the Indo-European forms for comparison, I have drawn largely from Skeat's Etymological Dictionary.

Before proceeding, however, to such comparison, I wish to direct attention to a few peculiarities of the language itself. A difference in the mode of thought has impressed itself upon many of its forms. To an English ear its idioms are often incomprehensible. A Highlander, for instance, may say: *Tha mi paiteach*, I am thirsty; the ordinary form, however is: *Tha am pathadh orm*, the thirst is on me. Similar forms are used in speaking of hunger, fear, sleep, etc. A young man may say to his sweetheart: *Tha gradh agam ort*, I have love on thee; analysed more closely, it would read. There is love at me on thee.

In describing a man's office or qualities, good or bad, a very singular form is used. In place of saying He is a king, a Highlander will say, He is in his king, *Tha e 'na righ*, or, It is a king that is in him, *Is e righ a tha ann.* She is a good woman, is expressed in Gaelic by the phrase : She is in her good woman, or, It is a good woman that is in her; *Is bean mhath a tha innte.* It is not easy to explain how such a form as this came to be used. Perhaps when the language was in process of formation, the ideas of the people in regard to personal identity may have been unsettled. The doctrine of the transmigration of souls and the facility with which, it was believed, witches and others could transform themselves into hares and other animals, may have led to a belief that bodies were not always possessed by the same spirit. It was a common superstition which is perhaps not yet wholly extinct, that there were "*little men*" living in the hills, at times invisible, who, after stealing children, would transform themselves into their exact image, so that the mothers would take them for their own and nurse them tenderly at the breast until some *fiosaiche*, or seer, would shew them that they were nursing some toothless, grey-haired old man from some neighbouring hill or *bruth.* These legends regarding the hill dwellers or fairies, may have a historical basis, and may be a shadowy remembrance in the mind of the Gaelic race of the aborigines of the west of Europe, whom they, on their arrival, displaced. In Gaelic the idea of possession or ownership is expressed by that of proximity. *Tha sgian agam*—the knife is at me. That knife is mine, is in Gaelic, *Is leamsa an sgian sin*, It is with me that knife is.

In Gaelic, changes may take place either at the beginning or at the end of a word, and the meaning may be much changed by what is called aspiration. For instance, *tog* means lift; *thog*, lifted. The possessive adjective *a* may be masculine or feminine, but this is determined by the form of the following word, as *a ceann*, her head, *a cheann*, his head. In Welsh, on the other hand, the word after the feminine adjective is aspirated. It is now known that these changes in the old language depended on other causes.

Gaelic and Irish are so nearly alike that, although the two races have been separated for perhaps thirteen hundred years, any intelligent, educated Highlander can read Irish almost as easily as he can his own language. Manx is also the same language written phonetically. Welsh, Cornish, and Breton, form a group distinct from, but closely allied to, Gaelic and Irish.

I shall now take the Gaelic names of some conspicuous and well known natural objects and actions common to the whole Aryan race, and endeavour to shew, by comparing them with other Aryan forms, how accurately they have been preserved by the Gaelic speaking people.

WORDS RELATING TO HEAT AND LIGHT.

Heat and light having been known to all the families of the Aryan race, it might be expected that its different branches would carry the original names of these elements with them to their new abodes.

In Sanscrit, *Gharma* (from the Aryan root, *ghar*, *gar*, to shine, to heat) means warm, hot. In Gaelic, *gar* means to warm: *Gar do lamhan*, warm your hands; *ghar e 'lamhan*, he warmed his hands." In Sanscrit, *ghri*, means to shine, to heat; in Gaelic the word for sun is *grian*, *a ghrian*, the sun; *griosach* in Gaelic is hot embers; In Sanscrit, *sura* is the word for sun, the shiner, as *grian* is the shiner in Gaelic, *sura* being from *swar*, to shine, as *sol*, the sun, is from the cognate *swal*, to shine. Now, the Gaelic word for light is *solus*, evidently connected with *sol*, the sun, and *swal*, to shine. *Soillsich* is one Gaelic word, meaning to shine, connected with *swal*, to shine; *suil* an eye, and *seall*, or *seoll*, to look, are of the same family. *Helios*, the Greek for sun, and *haul*, the Welsh word seem to be connected. Another Gaelic word for shine is *dearsadh;* and *dealradh*, which is slightly different in meaning, seems to be the same word, as *r* and *l* easily glide into each other, like *swar* and *swal; sur* and *sol*. The pronunciation of *dealradh* is peculiar; it is like *djealradh: dealanach*, lightning, is a word of the same group and is pronounced in a similar manner; both being probably from the root *ghar* or *ghal*, to shine.

There is a remarkable similarity between the Gaelic *soi*, a particle used in composition, meaning good or easily done, and the Greek particle *eu*, which, a learned friend connected with this Institute informs me, was originally *seu*. The particle in Gaelic expressive of the reverse of this, is *di* or *do*, like the Greek *dys*. *Soi-sguel* in Gaelic means good tidings; *soilleir* in Gaelic means what can be seen, *leir* meaning to see; *do-leir*, dark, what cannot be seen; *saoidh* means good, brave men; *daoi*, bad, wicked men; perhaps *dorcha*, dark, may be formed in the same manner from *do* and a root *arg*, akin to Aryan *ruk*, light. *Arguna*, Sanscrit; *argentum*, Latin; *argyros*, Greek, and *airgiod*, Gaelic, the various names for silver, are cognate forms, the *arg* in each case expressing the idea of shining, so that in these languages silver must have been regarded as the shining metal.

Another Indo-European root signifying to shine is *diw* or *div;* Sanscrit, *deva*, a god. This root has also been well preserved in Gaelic. *Dia*, god is evidently from this root and perhaps *deamhan*, devil. Old Gaelic for day was *dia*, the same as god; modern Gaelic for to-day is *diugh*, and for yesterday, *de;* Welsh has *dyw*, for both day and god. These Keltic words are as near the Aryan forms as *Zeus*, *Deus*, *Theos*. These words may point to a time when the sun, and perhaps light, were objects of worship.

WORDS RELATING TO WATER.

The Gaelic *uisge*, again, seems to be more nearly related to Sanscrit *udan*, and to the original root-form *ud*, *us* (to well, to gush) than any of the European forms, *hydor*, *unda*, (wave), *wasser*.

It is possible that *uth*, a cow's udder, (pronounced like *oo* in goose) is connected with *uisge* and with *ud*.

In the word *sruth* (pronounced *sru*) a stream or river, Gaelic has preserved almost intact the original root-form *sru*, which had precisely the same meaning.

In this connection may be mentioned the Aryan verb *snigh*, to wet, to snow, and the form *sneah*, moisture, represented in Gaelic by *snidhe or snighe*, meaning a tear, or rain coming through the roof. For example: *Tha snidh air mo shuil*,—the tear is on my eye. The English snow is in Gaelic, *sneachd*.

A most interesting form is that of the Gaelic word *snamh* (pronounced *snav*) meaning to swim, float, bathe. Kindred forms are Sanscrit *nau*, Greek *naus*, Latin *navis*, a ship, all, according to Skeat, from an Aryan root *ka* or *na* which again, is from an older stem, *sna*, to float, to swim, to bathe. It will be here remarked that the initial *s*, which has disappeared in the other Aryan tongues, is in Gaelic retained. Thus, to-day, in the popular speech of the remotest corner of the Hebrides, this venerable form preserves the sound and the meaning which it had, thousands of years ago on the plains of Asia.

Words Relating to Hearing and Speaking.

The Aryan roots *kru* and *klu*, to hear, are preserved almost intact in the Gaelic words, *cluas*, ear, *cluin*, hear; *claisteachd*, the sense of hearing, and in *cliu*, renown; the Latin *cluere* and the Greek *klu-ein*, to hear, are nearly the same in both form and sense.

It is remarkable that the two forms of the Aryan root *rak* and *lak*, to speak, and the Sanscrit *lap*, to speak, should both be preserved in Gaelic: *labh-air*, speak; *radh*, saying. "*Is fior an radh so*,"—this is a true saying.

Names of Various Objects.

When Skeat traces the words share, shear, shore, and scores of other words to the Aryan root *skar*, and to the base *ska*, he does not seem to know that *skar* or *sgar*, used in exactly the same sense, is one of the commonest words in the living language of Ireland and the Highlands of Scotland. For example: "*Sgaraidh e iad o cheile amhuil a sgaras buachaill na caoraich o na gabhraibh*,"—"He shall separate them one from another, as a shepherd separateth the sheep from the goats." The base *sga* may be found in hundreds of words, such as *sgap*, scatter; *sgoilt*, split; *sgireachd*, parish; *sgath*, lop and *sgian*, knife.

Is it a mere accident that thin is *tan-u* in Sanscrit; *tana* in Gaelic; and *ten-uis* in Latin; all apparently from the root *ta* to stretch? Can it be a mere chance that the root *tar* or *thar* and the variant *tra*, to go over or through, and the Sanscrit *tri*, through, should have so many corresponding terms in Gaelic, identical in meaning and form, as *thar*, across (*thar a chuian*, across the ocean) *trid*, through and *tarsuing* across; *tarsnan*, the rung of a ladder or any cross beam?

Lagh, *lag*, the Aryan root meaning to lie down. In Gaelic, *laigh* is to lie down; *lagh* is law in Gaelic, *i.e.*, a thing settled or laid down, like the Latin *leg-s*.

The dog must have been domesticated before the Gaelic-speaking people left the original seats of the Aryan race, as his name in Sanscrit is *cvan* or *cuan*; in Greek, *Kuon*; in Gaelic, *cu*; and in Latin *canis*.

The importance of this language for philological purposes cannot be over-estimated. The various branches of the Old Aryan race both in Asia and on the continent of Europe, have been so disturbed and mixed that the languages must necessarily have been greatly changed and broken up, while the people in the Highlands and in Ireland have been so isolated that their branch of the old language has been, as it were, bottled up, sealed and preserved for the use of the philologist. Words change but little when spoken by the same race, but when pronounced by alien lips they may change so as not to be recognized. The names, Dumbarton and Stirling, in Scotland, conceal their meaning when pronounced by Englishmen, but when pronounced by the Gael, they are still *Dunbreaton*, the Briton's fort, and *Sruithlia*, the rock stream.

The Gaelic system of orthography is so different from the English, that English scholars have been deterred from studying it. The Germans have been the great pioneers in this as in many other studies. It is to be hoped that, they having cleared the way, British philologists will follow, and take a share of the honour of working this interesting mine so long neglected.

THE CAVES AND POTHOLES AT ROCKWOOD, ONTARIO.

BY PROF. J. HOYES PANTON, M. A., F. G. S.

Some time ago while on a trip to Rockwood, with students of Geology from the Agricultural College, for the purpose of showing them some examples of how water acts upon limestone I was forcibly impressed by a most interesting series of Potholes found in that district, not far from where the somewhat well known caves are seen.

So impressive were these phenomena, that for three consecutive holidays, the students made their way to Rockwood, and on two of the occasions, were accompanied by myself.

A thorough examination of the locality was made, and data collected, which I purpose placing before you this evening, and which should be interesting to a Society that has been established for the purpose of developing the history of our Province whether it be written upon the rocks or pages of a more perishable character.

In treating the subject, the following divisions are naturally presented :—1. The location of the Caves and Potholes ; 2. A description of them ; 3. An explanation of their formation ; 4. Theories concerning the origin of the phenomena, that caused their formation.

1.—LOCATION.

Rockwood is a small village on the line of the Grand Trunk Railway, situated about 8 miles east of Guelph, and 42 west of Toronto. Leaving the station and proceeding in the direction of the village, you very soon observe that you are in a place well named—Rockwood, from the amount of rock in the vicinity. Along the river, which passes through the village are striking exposures of rock, at some places escarpments 50 to 70 feet high made up largely of massive layers of Magnesian limestone, belonging to the Niagara formation of the Silurian system. Fossils are not numerous, Crinoid stems are by far the most common; a few shells occur, and some fragments of coral, especially the genus Favosites. The fragmentary remains of the Orthoceras are seen at some places, but the fossils are neither common enough, nor so well defined as to work up the zeal of young geologists. However, after you have passed over the bridge that leads to some mills and the large quarries and lime kilns near by, you reach localities well suited to arouse enthusiasm in the mind of young students in science. The presence of three large lime kilns demonstrates that this stone produces excellent lime, exceedingly strong and well adapted for building purposes.

As you pass westward, along by the quarries, you obtain a fine view of the escarpment on both sides of the so called river and grand monuments of denudation are before you. In the distance about half a mile is the "Pinnacle" a large isolated piece of high rock, standing midway in the upper part of the mill pond. But at your side on the south side of the road along which you are travelling, your attention is arrested by a great hole at the base of the rocks. This is the entrance to a cave, which on examination proves to be of more than passing interest. In a line almost southeast of this and only a short distance away, but on the top of the bluff, you reach a pothole which rivals some that for years have been a great source of attraction to tourists stopping at Lucerne, Switzerland. Woodcuts of these are scattered in every direction, and no one can say that he has made a proper visit to Lucerne unless he has visited the "Glacier Garden" and observed the seven potholes, that are silent monuments of glacial phenomena long since ended—Yet here at Rockwood we can get a series of potholes larger in some respects and more unique than those at which so many thousands gaze in wonder each passing year. The formation and origin of these we will consider subsequently.

2.—DESCRIPTION OF THE CAVES.

The entrance to the main cave is 15 feet high and obstructed by great masses of rock, which have fallen from the roof. From the top of the cave to the summit of the overhanging rock is 40 feet of solid dolomitic limestone. Proceeding into the cavern you observe that the roof is very irregular, sinking at times to 5 feet, then rising to 7 and sinking again. At the mouth it is 29 feet wide and narrows to a width of 16½ at a distance of 36 feet from the entrance. Here it is only 5 feet high but on passing this point you reach another chamber, which widens and has at the left side a small chamber eight by six feet, but soon narrowing and dipping down till the cave seems to terminate at a point 30 feet farther than the narrow part and 66 feet from the entrance. This is as much of the cave as most visitors see, but being accompanied by students possessing pluck, endurance and zeal I was successful in securing data which will enable you to form some interesting conclusions about this comparatively unknown spot. Light ends here. A lantern was obtained and entering one by one a passage scarcely large enough for a human being to go through, for 8 feet, they wormed themselves through into another cave, shrouded in Egyptian darkness and gloom. This extends 10 feet to the left and 15 to the right i.e., has a diameter one way of 25 feet and 13½ the other.

To the left and right they found a pillar not far from where they entered; these supports seem to have been formed by the rest of the rock which once made up the solid rock being carried away. At the extremity on the right hand side, the floor was very muddy, and two small caves extending still farther, one near the passage by which they entered, the other at the opposite side; the former three feet by four, the latter three feet at the opening and tapering to a point and dipping downward. Prowling about in this gloomy chamber, not high enough to proceed comfortably, for it was only about five feet in the centre, they saw stalactites and stalagmites, some of them a foot in length and four to five inches in diameter at the thickest place. The floor of this chamber also dips slightly down. Directly across they came upon another pillar-like structure, with a passage on each side, opening into another apartment, where the roof was not over three to four feet high, and gradually narrowed so as to render farther progress difficult.

This extended ten feet across and about the same in width. On the opposite side from the entrance, there is an opening leading still farther, but the passage gradually narrows until farther advancement is stopped. Through this opening one passed, and threaded his way 13 feet, and reached a point 110½ feet from the entrance to the main cave. The floor of the last chamber inclines slightly, but in this prolongation the elevation is considerable. Sounding this last floor seemed to indicate that it was hollow beneath, and from the fact that the prolongation of the former chamber, near where this was entered dips downward, it is supposed a passage from it continues and likely passes under this last floor. All through these darkened caverns a good deal of mud was encountered. Water trickling down the sides and dropping from the roof added to the gloom of these darkened recesses, where daylight has never yet penetrated, and whose walls dimly lighted by the flickering light of the lantern, presented a somewhat weird, unattractive appearance. When the explorers emerged from these inner recesses of darkness, their clothes presented quite a changed appearance and indicated that much of their travelling must have been done in a somewhat menial position, and that they had been much associated with mud and water within. A little to the left of the entrance to the main cave there is an opening, which leads to another series of chambers, extending to a distance of 59 feet.

At a point in the vicinity of the first narrow place in the main cave there is a narrow passage leading into this series, in which the apartments are not so complicated, and being dry are much more easily examined. The first is some 25 feet long and 12 wide, narrowing to a passage into the second, 10 feet across, and opening into the main cave.

The general direction of the main cave is E. by S.E., to the narrow portion, then S.E. by S.; this course is maintained till the end is reached.

The roof through the whole series is exceedingly irregular, and the floor in many parts covered with fragments of the rock, which have fallen from the roof. Stalactites and stalagmites are found only in the inner chambers, and the latter seem more common than the former. Some may have formed in the outer, but have likely been carried away by visitors.

The diagrams before you will give a clear idea of the arrangement of these subterranean passages and chambers, and their relative position to each other. The whole series may be termed one cave, consisting of six well defined caverns, and as a sort of expansion on the sides of these four small ones.

POTHOLES.

Leaving the caves and clambering up the sides of one of the quarries near by, you reach the summit of an apparent peninsula of solid rock, along each side of which a stream flows at the present time, bordered by precipitous cliffs 50 to 75 feet high. The general direction of this rocky ridge is north and south.

The streams are united about a mile farther to the north, and after passing along the sides of this marked rock elevation, they join in the vicinity of Farrish's mill, and thus forming in reality an island, which terminates at its southern extremity in a limestone cliff.

About 500 yards from the caves, and near the end of the bluff, you suddenly come upon an immense hole in the solid rock; it has an oval form, its longer diameter being 20 feet and the shorter 15; one side is 10 feet higher than the other; it lies in a slight depression in the rock, which terminates at the side of the hole, with an abrupt fall of 22 feet. At the bottom of the hole you perceive an opening 4 feet high and 2 feet wide, but of an irregular outline, this opens into a sort of valley, but it must be remembered this is 40—50 feet above the level where the streams are flowing. This valley has rocks on both sides and forms a beautiful glen, at the present time a popular haunt for boys delighting to revel in the pastimes of youth.

Following in a south-west direction for some 60 yards the rock rises, and a little farther on ends abruptly with a fall of about 50 feet into the valley, through which a very insignificant stream at present passes.

On the opposite side of the valley about 100 yards wide at this place, the escarpment is fully 75 feet high. About the middle of this valley a slight elevation of solid rock some 15 feet high occurs. It occupies a peculiar position and form, appearing as if strong currents had worn away rock material, and left this irregular outlier, as a monument of conditions no longer seen in this place, where a mere creek meanders through a well defined ravine.

In this isolated area of rock on examination you find a most interesting and instructive series of Potholes, six in number, to some extent in a line with the large one already referred to, as located about 150 yards to the N.E.

A more unique series could scarcely be imagined. Calling that already described as No. 1, then here we have:—No. 2, 6 feet by 5 and 7 feet deep; No. 3, 1 foot by 1 and 3 feet deep; No. 4, 6 feet by 6 and 12 feet deep; No. 5, 8 feet by 4½ and 8 feet deep; No. 6, 6 feet by 6 and 10 feet deep; No. 7, 12 feet by 6 and 3 feet deep; No. 1, 20 feet by 15 and 30½ feet deep, from the highest side to the bottom and 21 from the lowest.

These holes in the rock have usually a greater diameter about half way down. The following measurements of No. 1 will show this:—Four feet from the bottom, 21¾ by 18 feet; midway, 23 5-6ths by 19½ feet; six feet from the top, 25 by 19½ feet. Generally speaking the outline of a vertical section is oval.

Holes 2 and 6 are on the edge of the rock, and consequently are somewhat imperfect; from 5, which comes near the edge, there is a small hole, which opens into the valley; this enabled us to empty it and learn the nature of its contents. At first we were desirous to investigate the contents of No. 1, and with that view dug for the first day, and returned to continue the work. Much soil, fragments of rock, etc., were dug up and wheeled away, but we found no trace of rounded stones. After several hours of hard work, it was resolved to proceed to the series in the valley and explore some there.

The facilities for working at the large hole are good, inasmuch as the material could be loaded into the wheelbarrow at the bottom, and wheeled away a short distance and emptied into the ravine a few feet below.

We proceeded to No. 5 and entered upon the work of cleaning it out; only a few spadefuls of earth were taken out when some stones were found, whose rounded shape had a wonderful inspiring effect upon the workers.

They were very round, and were of an entirely different composition from the solid rock in which the hole had been excavated.

After some two hours digging the bottom was reached and a fine collection, about two pailfuls, of rounded stones was obtained, varying from 6 inches in diameter to half an inch. Many of the small stones were as round as marbles.

These sixteen before you represent some typical forms, and will enable you to form an idea of the interesting nature of these stones, whose very appearance suggest questions as to how they came to be so round, and how they got where they were found?

We had hoped to have found similar in the large Pothole, whether such will be, remains to be seen. It might possibly be, that they have rolled out through the passage at the bottom of the hole and must be sought elsewhere.

No. 3 being small was emptied and some of the finest specimens of small rounded stones were got from it. Nos. 2, 4, 6, 7, have not been examined, and it is probable that an examination of them will meet with even more gratifying results than those emptied. Having had the pleasure of seeing the Potholes at Lucerne in Switzerland, it does seem to me that at Rockwood there is as interesting a series. Along the river near the quarries 18 more or less defined holes appear, and in this locality under consideration 12 in all are found, and of these the seven more particularly described are exceedingly unique in form, position and structure, and were they near a large city would be a source of great attraction to visitors interested in the works of nature.

3.—FORMATION OF THE CAVES AND POTHOLES.

In all districts, where limestone exists, it is not uncommon to find caves, especially if water is near. Water containing carbonic acid (a gas generated in the decomposition of vegetable material and largely present in the atmosphere, from them the respiration of animals; for the air expelled from their lungs is charged with it) has a powerful disintegrating effect upon the carbonates of lime and magnesia, forming from them bi-carbonates, which are soluble in water and as such are carried away; consequently it is only a matter of time before limestone (a carbonate of lime) when acted upon by water containing this gas is completely dissolved. A mere dripping in a crevice will in time effect quite a change and form considerable of a cavity. If the quantity of water is considerable, the change is accomplished in a shorter period. Very forcible examples of this disintegrating effect of water on limestone were observed by me in Derbyshire this summer. There are ravines there which are supposed to have been formed out of the solid rock in ages long receded into the past.

These ravines were once overcapped by limestone, the cave or passage itself dissolved and carried away by water, finally the top fell in and the debris carried seaward, until now all that marks the great caves are the walls, which form escarpments along the ravine, through which a rivulet passes at the present time. Near by a great cavern (Poole's) explains the process; the entrance is narrow and low, yet 12 feet in, and you reach a much wider passage, and as you proceed immense apartments are entered, so that you pass along a tortuous pathway for several hundred yards. Some of the apartments are 20 by 30 feet high and 40 wide. No running stream is seen to indicate the cause, but the water trickling down the sides explains this great disintegration of the limestone; so here, coming nearer home, at Rockwood, you find caves not so extensive, but as characteristic of the action of waters as those I have been referring to.

The presence of mud in the back part of the inner caverns at Rockwood seems to indicate a connection between them and the surface through fissures in the rock. This mud bears a close resemblance to the soil which covers the rock above, and has likely been brought down by rain through these crevices. This rain charged with carbonic acid in time could easily dissolve out the rock and leave the caverns as we find them now. Frost would assist in breaking off fragments as we find them now scattered along the floor of the cave, while the sides present a very irregular appearance.

The presence of stalactites on the roof and stalagmites on the floor, also shows much dissolving of rock by water, for these structures are merely the precipitated lime from the water, which has carried it down. The water on reaching the roof evaporates, and the lime is left, this goes on adding particles of lime, until a structure is formed not unlike an icicle in form, but composed of carbonate of lime. Sometimes the drops fall upon the floor and form something of the same in form. The stalactites are sometimes hollow but the stalagmites are solid; this is owing to the one being formed on the roof and the other on the floor. In some cases, those from the roof fall and become imbedded in the material on the floor. At Rockwood the stalagmites are more common than the stalactites, seeming to indicate that the water containing lime in solution falls before evaporation takes place, and consequently a tendency for an accumulation of lime on the floor.

POTHOLES.

The Potholes, too, are no doubt the result of the action of the water, but in this case the action is more mechanical than chemical.

Water must have passed over as a strong current, the place, where the potholes are now but in their first stages only a slight depression was in the rock. In these some hard stones collected and according to the strength of the current, the movement of the stones would depend; the motion produced would soon lead to a wearing away of the rock. Holes would form and deepen, as time rolled on, until a cavity would be produced not unlike a pot in outline. In all the holes examined, the diameter midway down was greater than at any other point. The stones grinding this out being harder than the rock, for you usually find they are pretty much the same as our boulders in the field withstand the wear and tear well, but in the course of time they become rounded and finally succeeded in making a pothole, which will vary in size according to the length of time the grinding has continued, the force of the current and the hardness of the rock acted upon. To-day we see no water near some of these holes, but we find that when the loose soil in the bottom of the holes is dug up it contains innumerable rounded stones of all sizes from a marble to that of a cannon ball.

I have already said the mechanical action of stones and water upon the limestone, in which we find these holes, has effected the condition of things we at present observe. There are two ways in which these currents of water may have acted.

4.—THEORIES OF PHENOMENA.

1. That of a great river, which filled the whole space between the highest banks at Rockwood, a stream bearing along a great body of water, with a strong current. As time rolled on it gradually lessened in volume and formed two streams, running along the valleys in which we find the streams of to-day, but much larger than they. At some period in this great river's existence it flowed across the depression, where you see the largest Pothole, and flowing over the precipice pursued its course along the line in which we find the other Potholes.

2. The water may have been a current under a glacier as we see in some cases at the present time in Alpine districts. A crevasse (crack) may occur miles from the end of a glacier, into this water formed on the surface, as it pushes its way into warmer localities, falls and finally makes its way out under the great stream of ice.

Such an under current getting into a depression in the rock, aided by stones from the glacier would be sure to produce Potholes. This is the origin of those at Lucerne. In such cases you are likely to find, that the stones derived from the glacier that did the work are large, and that the surface of the rock is much abraded illustrating glacial *striae* very impressively.

At Rockwood Potholes we so far have not been able to discover glacial markings, and among the rounded stones none exceeding six inches in diameter, and thus are inclined to think these holes have been worked out by the water of a river rather than that found beneath a glacier. However as further information is secured we may be led to modify the conclusions presented to-night.

EXPERIMENTS IN GOVERNING CANADA.

BY D. A. O'SULLIVAN, D. C. L.

The Canadian Union now in its twenty-first year is, so far as the Old Province of Canada is concerned, the latest of several experiments, for its good government. That Province was a divided Province for fifty years, and subsequently it was a united one for a little over half that period. With some variations in geography, it was the Old Province of Quebec; and within thirty years Quebec existed under what may be considered three forms of government.

The change in 1867 was accordingly the sixth change since the conquest or cession, and since the war commonly called in history the Seven Years War,—the treaty that terminated that war decided the fate of Canada.

Speaking of the fall of Quebec in 1759, and the capitulation of Montreal in the following year, I think the word conquest a perfectly proper one, and if there had been no treaty of union as there has been, Canada would have remained a conquered rather than a ceded portion of the British Empire. I entirely incline to the view that it is a ceded colony.

The period between the capitulation and the treaty covers less than three years. This was the period of martial law—the reign of the soldiery. It was of that uncertain character which is to be expected when the ultimate destiny of the country was in suspense—it was in fact an occupation by the English under the government of the drum-head. The English colonists were not satisfied and the French could not be expected to be satisfied.

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I do not think that the capitulations of Quebec and Montreal survived after 1763, except in so far as they can be read with the Treaty of that year, and whatever parts of the Treaty are inconsistent with these interim stipulations are superseded by it.

This period ought not strictly to be classed with our experiments in the government of Canada, but Canada was in somewise governed in that time though the subjects or citizens had no voice in the administration.

The Treaty of cession was, after long deliberation, signed in February, 1763. It was an international document signed by the representatives of England, France and Spain, and the signature of a representative from Portugal also testified to the concurrence of his country.

The Treaty provided for no domestic matters except freedom of religion to the new subjects of the British King, and so the municipal government of Canada must be looked for in some other document. The Treaty was the deed of conveyance just as the Treaty of 1803, conveying Louisiana to the United States, or the Treaty of 1819, disposing of Florida.

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The Proclamation of 1763, is an important document historically, but before referring to it a glance at the map will assist very materially in estimating the geographical position of affairs.

In 1763, the old thirteen Colonies were still British—they extended eastward of the Mississippi to the seaboard, and from Acadia in the north to Florida in the south. New France whatever its western limits may have been is very generally associated with the name Canada. The Mississippi was taken to be the boundary after 1763 between France and England; and so, when Canada with all its dependencies was ceded to England, it embraced roughly whatever lay to the east of that river and north of what were then and afterwards British Colonies. By a subsequent clause in the Treaty of 1763, Spain ceded Florida to England, and the latter found herself with two strips of the continent to be dealt with in the Proclamation of government. This territory was divided into four parts of which this country was one; and the only portion of the Proclamation pertinent to our subject is this that "as soon as the state and circum-"stances of the said colonies will admit thereof, the governors will "summon and call general assemblies, with power to make laws for "the public peace, welfare and good government of the inhabitants "as near as may be agreeable to the laws of England. In the mean-

"time all colonists could confide in the royal protection for the enjoy-"ment of the benefits of the laws of the realm of England."

This Proclamation with the care of Canada was entrusted to Sir Guy Carleton, and Canada was, during eleven years, governed much as it had been in the preceding three years. It was government very like what obtained in the North-West Territories before any representation was accorded to them. It is needless to say that the inhabitants, after waiting until their patience was exhausted, complained and then petitioned for relief from the intolerable state of things. The information that reached London was of two very different complexions.

There was on the one hand a demand that the British laws and institutions should be declared to be in force in the country. This though coming from a minority trifling in point of numbers was still put forward with great energy and with many advantages on its side.

On the other hand the ancient inhabitants required a continuance of the laws and institutions under which they had flourished for over a century. They numbered 70,000, as against less than 500, of the recent additions to the Province. The ministry in England then passed an Act of government favorable to the ancient subjects, but unfortunately obnoxious to the minority. This was the Quebec Act —a very important charter of government.

The Quebec Act was passed to define the boundaries of the newly acquired territory, and to put beyond doubt the character of the laws in force as well as to determine certain domestic matters within the Treaty of cession. It must be concluded now that it was no easy matter to establish laws that would suit the old and new subjects of the King.

There was one Englishman to every two hundred Frenchmen. The view taken by the English statesmen favored the re-introduction of the old French law in civil matters, leaving the criminal law of England the rule in such cases. The boundaries of the Province were then enlarged as appears by the map, and it would seem that the English had in view the taking in of a French settlement near the junction of the Ohio and the Mississippi. The Old

Province of Quebec included not only the present Province of that name, but also the present Province of Ontario and part of four, five or six States of the American Union. The Quebec Act did not grant a legislative assembly to the people, but an advising council only. This body passed ordinances under which the people were governed for sixteen years, until the next change took place. The extended territory of Quebec did not last so long, for within a little over a year the Thirteen Colonies declared themselves independent, and by the Treaty of 1782, the territory south and east of Lake Erie and Michigan was severed from Quebec. In the census taken by Sir Guy Carleton in 1784, the population was put down at 113,032—subsequently considerable accesions had been made to the numbers of English settlers, so that when a new change of government was granted in 1791, the numbers stood not quite three Frenchmen to one Englishman.

Under this change of what is called the constitutional Act, the two classes of Colonists were still opposed to each other and the result was that the English settlers were very nearly as much disappointed as they were in 1774. They wanted a repeal of the Act—a new constitution for the whole territory. The Quebec Act was not repealed—the Province was divided leaving to the inhabitants of each division the power over their own laws. The Upper Province at once adopted the English laws. In matters of civil proceedings—the boundary at least for part of the way was established between Eastern and Western Canada, and the divided Canadas set out in their separate destinies. For fifty years they existed in this way—the largest period in our history under possibly the most unsuitable form of government. There were two houses for legislative purposes, and an executive Council with a Governor of large independent powers. The Constitutional Act was a misnomer, and after the first one-third of its existence the Provinces were dissatisfied and finally became rebellious.

The agreement of the people with the ruling powers was not an effective instrument until the Provinces were again united in 1841. The powers of the Governors were to be exercised through responsible ministers, and a form of government prevailed for a quarter of a century not very materially different—except as to division of legislative powers—from what prevails now, with one Parliament—if we may call it such—legislative on all subjects competent to a Colony—for the peace, order, and good government of Canada. A slight change was made in the constitution of the Upper Chamber in 1856, and shortly afterwards the united Canadas cast about them for partners in the formation of a new Dominion. The Union of 1867 was the result, the last of the experiments in governments.

Before discussing this latest form of government, it is well to recollect that the English Government in every instance since the cession, aimed at granting such a form of government as the majority desired. The changes since have been changes of necessity. The Quebec Act was intended to provide for a colony almost entirely composed of one race and one religion, settled in one part of Canada, between Montreal and Quebec. The constitutional Act of 1791 had to deal with an important piece of territory west of Montreal, and for the most part of another race and another religion. Mr. Pitt's Government accordingly divided the original territory, leaving each section to manage its own affairs. One portion retained the French laws under the Quebec Act, the others introduced the laws of England. Had there been any fair grant of representative institutions, this might have subsisted to this day. Indeed it is claimed that now there is somewhat of a return to this ancient form of government. In 1841, when the discontent was too obvious to be overlooked, it was discovered that a change was necessary. The remedy was not so much in a union of the two Provinces as in the right to responsible government. Still a union was not so unlikely, when it was discovered that the two races were all but evenly balanced. A united Canada after the experience of two rebellions was fancied more stable and likely to be respected, than a divided Canada.

It is to be borne in mind, however, that the variations in the forms of government have been due largely to the fact that while the French population increased with the normal rapidity of a people receiving no additions from abroad, the English speaking inhabitants increased from 500 at the cession to 100,000 at the Act of 1791, and half a million at the Act of Union, fifty years later. These circumstances are sometimes overlooked by those who complain of every state of affairs before a change is made in the constitution, and complain equally after each has been made.

In 1867, there was a certain reversion to the Act of 1791, so far as the Canadas are concerned. There was to be a Legislature, one in Toronto and one at Quebec, and though there are such, but with considerably curtailed powers they are with such powers, as Ontario and Quebec desired to have. The praise or blame of confederation, the excellences or defects of the British North America Act of 1867, are to be laid at the charge of these two Provinces. If New Brunswick came in unwillingly, or if Prince Edward Island refused to come in after agreeing to do so, the other Provinces carried the Imperial Act; and it is not too much to say that if the Act does not follow the agreement of the Provinces signed in Quebec in 1864, the Canadas thought it best to have an Act carried in the best way they could. Looking at this latest charter of government, it is of course a very great departure from any of the charters that preceded it in Canada. A federated monarchy, or a monarchical federation was, except in the United States, a thing unknown to the English speaking people. There was a division in their powers of governing: one set of officers and machinery to do part of the legislative and executive work, and another set and other machinery to do the other part, leaving it forever a vexed question as to the exact boundary line between their powers, and their duties. The government of the new Canada was let out so to speak on shares, one Legislature to do the home work for each member of the Union, and the other to do the general government for all the members.

The Quebec resolutions set out with considerable diffuseness the different classes of legislative control, but the Act of Union did not exactly sanction that allotment. That may or may not be now a cause for amending the Act—it does not seem to me there is any substantial departure, or if there is that it has worked any great injustice.

To keep the different legislatures within their own limits was of course a very delicate matter to adjust. In the Belgian Union there is no constitutional check, in the United States there is the Supreme Court—all the courts in fact—with us there is as well the veto of the central government. This has become almost a party question, so that it is difficult to say anything of it without seeeming to depart from the pure political aspect of the question. I do not hesitate to say that as a veto must come from some quarter, I prefer to have it come from our own representatives. The members at Ottawa who exercise the power of vetoing provincial legislation, are themselves elected to office by the men of the Provinces, and though they cannot directly be called to account, an attack upon any one Province is an attack upon all. To that general reason I would assign another perhaps as forcible, and that is that the line of demarcation between the powers of central and local governments ought to be better known to the men of Canada than to the ministers of the Crown in Great Britain. That may be some reason for handing over this power to Judges of the Supreme Court, but whatever may be the defects of the judgment of the Cabinet it has the advantage of coming to the public as the decision of one person. The Supreme Court as every other Court gives the individual opinion of each member, and if a Provincial Act were to be upheld because three Judges were in favor of it while three were against it, that would not diminish the dissatisfaction. The Act of Union is largely taken up with Ontario and Quebec—indeed nearly one-half is devoted to these Provinces. The other two came in with their legislatures unimpaired, and the executive power altered only so far as thereafter the Lieutenant Governor was sent from Ottawa and not from England. The carefulness to provide for the Canadas gives rise to the suspicion that those who piloted the Act in 1867, were doubtful if the simple provisions given to New Brunswick and Nova Scotia would suffice for the other provinces. With the United States constitution as a model worthy of being followed, it is rather remarkable that it was altogether departed from in this respct. The United States constitution guarantees a republican form of government to each of the States, and there practically the matter rests.

THE ESKIMO RACE AND LANGUAGE.

THEIR ORIGIN AND RELATIONS.

BY A. F. CHAMBERLAIN, B.A.

Within the confines of the Dominion of Canada, the ethnologist and the philologist can find fit subjects for investigation and research. In our Eastern Provinces we have still feeble remnants of that mighty race, which, as late researches have shown, once occupied the whole country East of the Mississippi, from Florida to Labrador, and whose original seat, Mr. Horatio Hale thinks, was on the borders of our own St. Lawrence, whence they spread in times long past, to the south and south-west. In Manitoba and the adjoining districts of the Territory, some have seen evidences of the sojourn of that wonderful people, the mysterious "Mound-Builders," while in British Columbia and on our far western border, there linger yet tribes whose language yields us evidence of connection, perhaps even kinship, with the famed Aztecs of the land of Anahuac. Across the vast plains of our North-West Territories the Cree and the Athapascan have wandered from time immemorial, long ere the white man set foot upon the "new discovered isle." But to the student of America's past, there can be no tribe, no nation, so interesting as that which occupies our sea-coast from Labrador to the borders of Alaska, continuing thence even into the Old World, the *Innuit* or *Eskimo*, as they are commonly designated. To use the language of Dr. Latham, "the *Eskimo* is the only population clearly and indubitably common to the two Worlds, the Old and the New."* The habitat of the Eskimo stretches from Labrador and Greenland to the shores of the River Anadyr in North-Siberia. From the North-western to the South-eastern point of the Eskimo territories is in a straight line about 3200 miles. The distance along the coast, which is their natural line of migration is not less than 5000 miles.* They seldom advance into the interior to a greater distance than 150 miles, and even then the line of progression is generally up a river or water-course. Dr. Rink, has however given some reasons for believing that Eskimo are not so exclusively a coast-people as has commonly been supposed.

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*Native Races of the Russian Empire, 1854, p. 291.

As a rule, the Eskimo communities are not very large, although at certain favourable localities, considerable villages are to be found, as at the mouth of the Anadyr, and on the Tchukstchi Promontory in Siberia, at Point Barrow, in Alaska, at the mouths of the Mackenzie, at the mouth of the Churchill, and at various points in Labrador and Greenland. As tribal divisions seem to be absent from Eskimo sociology, (although many writers have seen fit to speak of such), the only method of properly classifying the various Eskimo communities is a geographical one, the peculiarities of dialect, etc., being such as to render this practicable.

A broad division into *Eastern*, *Northern*, *Central* and *Western* Eskimo, might be made, and has been proposed, but lacks accuracy and precision, for each of these great divisions is susceptible of being further separated into various smaller sub-divisions. Dr. Rink† divides them generally thus :—(1) *East Greenlanders*, occupying the whole of the coast down to Cape Farewell; (2) *West Greenlanders*, from the Cape to 74° N.L., and further sub-divided into North and South Greenlanders; (3) *Northern Greenlanders*, (or the *Arctic Highlanders* of Sir John Ross) on the west coast, North of Melville Bay; (4) *Labrador Eskimo*; (5) *Eskimo of Middle Regions*, from Baffin's and Hudson's Bay to Barter Island near the Mackenzie River—the most widely-spread of all the divisions occupying an extent of land measuring 2000 miles in length and 800 in breadth; (6) *Western Eskimo*, on the coast from Barter Island to the West and South; (7) *Alaskan Eskimo* (including Aleutians); (8) *Asiatic Eskimo*. O. T. Mason,‡ distinguishes them as follows :—(1) Greenland; (2) Labrador and Ungava; (3) Baffin's Land; (4) Mackenzie River; (5) Pt. Barrow; (6) Kotzebue Sound; (7) Asiatic

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* Rink, Tales and Traditions of the Eskimo, 1875, p. 2.

† Loc. cit. p. 3.

‡ Eskimo of Pt. Barrow, Amer. Naturalist, Feb. 1886, p. 197.

Eskimo; (8) Norton Sound; (9) Nuniwak; (10) Cape Nome; (11) Bristol Bay; (12) Kadiak and the mainland. For the *Greenland* Eskimo the sub-divisions made by Dr. Rink, into Eastern, Western (Northern and Southern branches), and Northern will probably be sufficient. There would appear to be some differences, in dialect and other matters, between the various settlements of the Labrador Eskimo, at Okkak, Ungava, and Stupart's Bay, a short vocabulary from which latter region has been furnished by Mr. R. F. Stupart.* The differences between these again and the Eskimo of the Cumberland Sound region are also noticeable. The Eskimo of *Baffin Land* are arranged by Dr. Franz Boas † in seven divisions; distinguished by peculiarities in dress, methods of hunting and fishing, language, etc., thus—Two important tribes possess the north coast of Hudson's Straits, one the peninsula between Frobisher Bay and Cumberland Sound. The remainder of Davis Strait is divided by the Eskimo into three parts, viz., Aggo, Akudnirnan, Oxo, the tribal distinctions being the Aggomiut, Akudnirmiut and Oxomiut. The termination *miut*, which here appears, is not really a tribal name, but simply means, "dwelling," the Aggomiut are those who dwell in Aggo. Some authors, not taking the trouble to investigate the use and meaning of this suffix, have talked about the various tribal divisions of the Eskimo, whereas such distinctions, as are found, are as I have just pointed out, geographical. The Eskimo of the *Churchill River*,‡ seem to differ considerably in dialect both from the Eastern Eskimo and those of the Mackenzie River, whilst the *Winter Island* Eskimo though resembling those of Labrador in dialect, have nevertheless their distinguishing peculiarities. The Eskimo words collected by Hall,§ seem to contain some peculiarities both of the Labrador and of the Alaskan dialect. The nasal *n* which is found in Aleut ‖ as the sign of the Nominative, occurs frequently in Hall's words (Kooming, ooming, etc.), instead of the *k*, which is more general in the Central and Eastern dialects.

Another considerable collection of Eskimo is to be found on *Anderson's River*, but they are not very sharply distinguished from their neighbours on the Mackenzie.[*] Of the latter we possess considerable information, which has been collected and published together with a somewhat extensive vocabulary by Father Petitot,[†] the distinguished missionary to these inhabitants of the far north of our country. Passing the Eskimo of Cape Bathurst, the Innuit population of *Alaska* next engages our attention. Alaska having previous to its purchase by the United States, been a Russian province, there necessarily is in Russian archives and in the writings of Russian travellers and explorers a considerable stock of information regarding its inhabitants, but what of this is of greatest value has been extracted by German, French and English writers upon the subject. Waitz[‡] divides the *Alaskan Eskimo* (including the Kadiak) into thirteen dialects. The far western Eskimo (including those of N.E. Asia) are arranged by W. H. Dall[§] as follows:— I. *Asiatic Eskimo* or Yuit (a corruption of Innuit), in the extreme N.E. of Siberia, migrating with the seasons from Cape Olintorsk to East Cape, the most northern village being at the latter point. They are known also as Chukluknmut, Namollo and Tchukchi. At East Cape they are called Nogwunmut. They are divided into the Tchukchi of the Anadyr, and those on the Tchutskoi Nos, or Tchuktchi Promontory. II. *North-Western Innuit*, (1) Kopagmut or Kupungmun, the name of the people of the Mackenzie River as called by the natives at Point Barrow; (2) Kangmaligmut or Kungmudling, of the Colville River; (3) Nuwukmut or Nuwungmun (*i.e.* people of the point), the name of the Eskimo of Point Barrow; (4) Nunatogmut or Nunatanmiun, the people of the River Nunatok; (5) Kuagmut or Kawagmut (including the Selawigmut on Lake Selawik) on the Kuak or Kowak River. III. The *Island Innuit*, (1) the Imahklimut or people of Big Diomede Island; (2) Ingulikhmut on Little Diomede Island; (3) Shiwokugmut or Kikhtogmut on St. Lawrence Island, these number about 150 souls. The Ingulikhmut scarcely number 40 persons. IV. The *Western Innuit*, (1) Kaviagmut (including the Kingigemut of Cape Prince of Wales), inhabiting the peninsula between Kotzebue and Norton Sounds, called by them Kaviak; (2) Mahlemut, occupying the neck of land between Kotzebue Sound and Norton Bay, they do not range south of Lake Selawik; (3) Unaligmut, on the shores of Norton Sound and south on the coast, to the mouth of the Yukon; (4) Ikogmut or Ekogmut; (5) Magemut (the Nunwak people on the N. coast call themselves Magemut); the Magemut or Mink-people range south-west of the Yukon, between it and Cape Romanzoff; (6) Kaialigmut, between the northern Magemut and the Kuskwogmut; (7) Kuskwogmut, at the mouth and on the banks of the Kuskwoquim River, extending inland to the Kolmakoff redoubt; (8) Nushagagmut (including the Chingigmut and Togiagmut of the U.S. census map of 1880), on the shores of Bristol Bay, near the mouth of the Nushergak River; (9) Oglemut or Aglemut, south of the Tinneh and Iliamna Lake, extend south-east approaching the peninsula and range westward at times to Port Nöller; (10) Kaniagmut, in the south-west of Alaska eastward to the 60th degree of Lat., the island of Kadiak (originally Koniag), and the adjacent small islands of the Kadiak Archipelago; (11) Chugachigmut, south and east shores of Kenai Peninsula, and shores of Chugach Bay (or Prince William's Sound, ranging from western extreme of Kenai Peninsula to the mouth of the Copper or Atna River and Kayak Island. Besides these Mr. Dall mentioned in 1869, the Kinkhpagmut, in the delta on the Yukon, and some 50 miles up the Kwikhpak, one of the Yukon-mouths, the Kusilvagmut, on the Kusilvak mouth, and the Ugalakmut near Mount Saint Elias. V. *Aleutians* (Unungun), on the western Aleutian islands; the chief villages being on Atta and Atka islands. They may be distinguished as follows: (1) Unalaskans (on the Fox Islands, principally on Unimak, Unalaska, Umnak and Akhun; (2) Atkans or Andreanoff Islanders (on Atka, Amlia, Adak and Attu. The number of these Eskimo Mr. Dall estimated as follows:—Northwestern Innuit, 3,100; Asiatic Innuit; Island Innuit 190; Western Innuit 14,500; Aleutians 2,200.

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* Eskimo of Stupart's Bay, Proc. Can. Inst., 3rd. Series, Vol. iv., p. 113-114.

† Die Sagen der Baffinland Eskimos, Verh. der Berl. Gesell. für Anthrop. Ethnol. u. Urgesch., 1885, S. 162.

‡ Petitot, Vocab. Français-Esquim., 1875.

§ With the Esquimaux, 1865.

‖ Henry, Grammaire raisonnée de la Langue Aléoute.

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[*] McFarlane Esk. of Anderson's R. (Hind, Trav. in Interior of Labrador, i., p. 258).

[†] Vocab. Français-Esquim., 1875.

[‡] Anthropologie iii., S. 301.

[§] Vice-Pres. Address Sect. H. Proc. Am. Ass. Adv. Sci., Aug. 1885., p. 377. See also Dall. On Distrib. of Native Tribes of Alaska, Proc. Am. Ass. Adv. Sci. Salem, Aug. 1869, pp. 263-73.

The tribal nomenclature of the *Baffin Land* Eskimo,[1] partly given above, is fully as follows:—(1) Seikossiularmiut on the extreme South-west; (2) Akudliarmiut, on the north coast of Hudson's Straits; (3) Nugumiut, on the Peninsula between Cumberland Sound and Frobisher Bay; (4) Okomiut, in the Cumberland Sound region; (5) Akudnirmiut, on the coast of Davis Strait from Cape Searle to Cape Eglinton; (6) Aggomiut, on the coast of Prince Regent's Inlet.

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[1] Die Bewohnsitze u. Wanderungen der Baffinland Eskimos, Deutsche Geogr. Blätter, Heft I. Band viii., Bremen, 1885. See also Proc. Roy. Geo. Soc., New Series, Vol. vii. 1885, p. 407.

The following is the list of the tribes known to the Tchiglit or Mackenzie River Eskimo, and their Eskimo designations as given by Father Petitot.[1] (1) Piktorméut [the inhabitants of (the country of) powdery snow], a tribe on the other side of Behring's Straits. The locality they inhabit is called Pirktork (la poudrerie); (2) Natervalinèt, the inhabitants of Natérovik, the Russian post at the Mikaëlowski redoubt; (3) The Tuyormiyat, or the inhabitants of Behring's Straits. Their country is called Tchikrénérelérk; (4) Apkwaméut (the enclosed, sedentary people.) The Tchukatchis of Kotzebue Sound. Their locality is called Kranik (la neige étoilée). From these the Tchiglit of the Mackenzie have obtained the kind of boots called apkwaméortok; (5) Nunatagméut, or those who live at Nunatagmun, towards the strait. This region is also called Tchikreynérk kagvirartchinerk (the sun shows the end of its nose); (6) Nuvungméut, the inhabitants of the Cape; in the region around Cape Lisbon; (7) Akillinerméut, the inhabitants of Akillinerk, between Cape Lisbon and Icy Cape; (8) Tarèorméut (the people on the sea), from Herschell Island to Liverpool Bay, and in the mouths of the Mackenzie; (9) Kamalit, or Eskimo of Anderson River; (10) Kragmalivéit, inhabitants of Cape Bathurst; (11) Kravanartat (people of the east); this appellation is rather vague and designates all the Eskimo between Franklin Bay and the Copper River, or even Melville Peninsula; (12) Anénérit or Innuit of the great east; a still more generic name applied to all the Eskimo of Hudson's Bay, Labrador, and Greenland; (13) Krikertalorméut (the people of the isles), under this name are comprised all the Eskimo of the lands in the Polar Sea. Besides these there are the following names of tribes of the Central Eskimo, not known to the Tchiglit, but belonging to the people of Liverpool Bay: (14) Kroleyloréut (the people of the Reindeer Mountains), east of the Mackenzie; (15) Naggiuk-torméut (the people of horns), at the mouth of the Copper River; (16) Kanerméut (the people among the white partridges), to the east of Cape Alexander; (17) Utkutçikialin-méut, (the people who use stone kettles), on the shores of Boothia Gulf; (18) Ahaknañèlet (the silly women, les femmelettes), in the region of Repulse Bay.

The best brief classification of the whole Eskimo stock is that of Dr. Rink, which is as follows:

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[1] Loc. cit., Monographie, p. x-xi.

Aboriginal Inland Eskimo.

Principal Stem. Eskimo Proper.
Side Branch, Aleutians.

Eastern.
V. Western.

III. Mid. Region. Iglulik, Repulse. Bay, Churchill R.
IV. Mackenzie River.
I. Greenlanders.
II. Labradorians.

Northern.	Southern.
1. Pt. Barrow.	6. Tchugazzes.
2. Kaviagmute.	7. Kadjagians.
3. Malemute.	8. Kangindlut.
4. Unaligmute.	
5. Ekogmute.	
9. Asiatics.	

With regard to the Greenlanders and Labradorians, as well as the Asiatics,[1] a little more detail might be employed, although not necessary perhaps in a broad general scheme.

The name *Eskimo* or *Esquimaux*, by which these interesting people are commonly designated, is said to be derived from an Algonquin term signifying "eaters of raw flesh." Charlevoix[2] says that the Abenakis of the Gulf of St. Lawrence called the people now known as Eskimo, *Eskimantik* (eaters of raw flesh). Dr. D. G. Brinton[3] states that the word Eskimo comes from an Algonkin word *Eskimantick*, "eaters of raw flesh," and states that the Tuscaroras, in their traditions regarding their arrival on the coast of Virginia, speak of "a race they found there called Tacci, or Dogi, who were eaters of raw flesh, and ignorant of maize." And the general opinion of writers on the subject is that the word *Eskimo* or *Esquimaux*, is of Algonkin origin and conveys the idea of "eaters of raw flesh."

Richardson[4] attempts to derive it from the French words *ceux qui miaux* (*miaulent*), referring to their clamorous outcries on the approach of a ship. Petitot[5] says that at the present day the Crees of Lake Athabasca, call them *Wis-Kimowok* (from *Wiyas* flesh, *aski* raw, and *mowew* to eat), and also *Ayiskimiwok* (*i.e.*, those who act in secret). In Labrador the English sometimes call the Eskimo, *Huskies*[6] and

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[1] Eskimo Dialects, Journ. Anthr. Instit. Gt. B. and Ire. vol. xv., p. 244. See also Amer. Naturalist, April, 1886, p. 408.

[2] Quoted in Petitot, p. ix.

[3] Myths of the New World, p. 214.

[4] Arctic Searching Expedition, p. 203.

[5] Cf. Chambers Encyc. Ed. 1880, vol. iv., p. 165. Article Esquimaux.

[6] Loc. cit. p. ix. [7] Chambers Encyc. Article Esquimaux. See Hind. Trav. in Int. of Labr., loc. cit., and Petitot loc. cit. p. ix.

Suckemos,[1] and Dall[2] says that in Alaska the Tinneh Indians call them *Uskeeme* (sorcerers). The general appellation of the Eskimo of Greenland, Labrador, Hudson's Bay, etc., is *Innuit*, (*i.e.*, men, the most frequent tribal name among savage, or primitive peoples.) The Southern (but not the Northern Greenlanders), also call themselves *Karalit* (Kalalck), which has been conjectured by some writers to be a corruption of the name "*Akraellinja*," which the Old Norse discoverers applied to the Eskimo.[3] The Esquimaux of the Mackenzie[4] call themselves *Tchiglit*; those around the Churchill *Akut* or *Agut*; the Aleuts *Tagut*; the Tchukatchis *Tachut*; the Tuski *Tchuktchit*, all of which terms signify men (viri), as *Innuit* signifies human beings (homines). Designations other than those mentioned above, are simply descriptive, either of locality, or some peculiarity in the manners, customs, etc., of the people specified. The usual termination of these descriptive names is in *miut* (meut, mut), which Petitot[5] says marks, "residence, possession," and Rink[6] defines as "inhabitant of." Thus the people on the Gt. Fish River are called *Utkahikaling-mëut* (people of the stone-kettles); the Eskimo near Cape Alexander are termed *Kangor-meut* (Snow Goose people); around the Copper mine are the *Naggeuktor-meut* or "deer horn," Eskimo;[7] the Eskimo of Point Barrow are called *Nuwuk-meut*, people of the point or cape. The termination *miut* is found attached indiscriminately to the name of the residence of any locality, no matter how small or how large the community may be. Fifteen or more different tribes (so-called), whose names all end in *miut* are met with in Alaska alone, and the same is the case in the far east of the Eskimo territory.

The general name given by the Eskimo to the European is *Kablunak* (Greenland), *Kuppelunet* (Church Riv. pl.), *Cublunac* (Stupart's Bay), *Krablunait* (Mack. R.), *Cappélunet* (pl., Church. R.), *Koblunar* (Huds. B. and Cumb. Sd.), *Kablunak* (Labrador). This Petitot[8] translates 'couronnés,' and says it is derived from *krablut* (eyebrows) or *krablunark* (frontal or coronal bone), and thinks the name was given by the natives to the Europeans, on account of the latter wearing a cap or hat, covering their foreheads down to the eyebrows. But L. P. Peichel[1] says "the Eskimo of Labrador" designate the rest of mankind as *kablunait*, *i.e*, inferior beings, calling themselves, *Innuit* (men). Dr. Brinton[2] referring to C. F. Hall[3] says, the first men created were called *Kaudluna* (from the root *kau*, white etc.), and this word seems to be the same as the general appellation bestowed by the Eskimo upon Europeans. Besides the general term of '*Kabluna*,' various descriptive and picturesque epithets are, in different localities, bestowed upon white men by the Eskimo. Thus in Greenland the Danes are termed *Ukissut* (the winterers)[4]; at Pt. Barrow[5] the crew of the 'Plover' were termed "*Shakenatanagmeun*," (people from under the sun), or *emakh-lin* (sea-men), but more frequently *nelluang-meun* (unknown people). The Eskimo of the Mackenzie[6] term the Hare Indians, whom they hold in great contempt, *Nouga* (spittle). These Eskimo also call the Indians of the Loucheux Tribe, *ipkrelirk*, plural *irkrelit* (nits, larves de poux), those of the Rocky Mountains they call *Kublaw-Kutchin*, and those of the Youkon *irkrelearuit*.[7] The people of Pt. Barrow call the Kutchin Indians *It-Kudling*; the southern Innuit call the Indians *Inkalit*; according to Mr. Murdoch,[8] the Pt. Barrow Eskimo term the Red Indian (who has become a fabulous being) *It-Kudlinq*, (the *Ingalik* of Norton Sound) meaning "son of a nit," evidently the *erkilek* of "Greenland legend;" all these terms are probably the same as the Tchiglit "*irkrelit*," cited above.

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[1] Richardson, Arctic Searching Expedition, p. 202.

[2] Proc. Am. Ass. Adv. Sci. 1869, p. 266.

[3] E. B. Tylor, Journ Anthr. Inst. Gt. Brit. and Irel. xiii., p. 349. Rink, Danish Greenland, p. 404.

[4] Petitot, loc. cit. p. x.

[5] Loc. cit. p. liv.

[6] Tales and Trad., p. 18.

[7] Sir John Richardson, The Polar Regions, 1861, p. 300.

[8] Loc. cit., p. xi.

The question of the origin and migration of the Eskimo race has been much discussed, especially of late years. Such is the resemblance thought to exist in physical features, between the Eskimo and Mongol tribes of North-eastern Asia that the majority of writers upon the subject have been content to regard the former as but a comparatively late offshoot of the latter. Such was the opinion advanced by

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1. Eskimo of Morav. Missions in Labrador. (In Hind's Exped. into Inter. of Labrador 1863, app. vii., p. 296.
2. Myths of the New World, p. 195, Note.
3. Arctic Res., p. 556; cp. Crantz, i. 188.
4. Rink, Dan. Greenld. p. 402.
5. Richardson, Polar Reg. p. 300.
6. Hind, loc. cit. p. 258; cp. Richardson, Arctic Search. Exped., p. 209.
7. Petitot, loc. cit., p. 43.
8. Amer. Naturalist, Jul 1886, p. 509.

Wrangell,[1] Prichard,[2] Steller,[3] Crantz,[4] Lütke,[5] Morton,[6] McDonald,[7] Mitchell,[8] Sir Daniel Wilson,[9] Fontaine,[10] Palmer,[11] Dawson,[12] Figuier,[13] Ujfalvy de Mezokovezd,[14] Peschel,[15] Petitot,[16] Petroff,[17] Dr. John Rae,[18] Nadaillac,[19] Prof. Flowers,[20] Elliot,[21] Topinard,[22] and many others. Du Ponceau and Gallatin[23] note resemblance between the Red Indian and the Eskimo, which view is also shared by Prichard,[24] Dr. Latham,[25] on account of physical resemblances ally them with the Asiatic Mongols, but at the same time note a certain likeness in language to the American Indians. On the other hand some later writers have concluded that the Eskimo are American aborigines. This is the view taken by Dr. Robt. Brown.[26] Dr. Rink,[27] the eminent Danish scholar, has expressed the opinion that "the Eskimo appear to have been the last wave of an aboriginal American race which has spread over the continent from the more genial regions following principally the rivers and water-courses, and continually yielding to the pressure of the tribes behind them, until at last they have peopled the sea-coast." W. H. Dall,[28] Dr. C. C.

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1. Refd. to in Peschel. loc. cit.
2. Researches. vol. iv., p. 463.
3. Kamtschatka, refd. to in Peschel, loc. cit.
4. Historie von Groenland.
5. Voy. Autour du Monde, vol. 2, p. 209.
6. Quoted in Norman's Rambles in Yucatan, p. 251, Cran. Am., p. 260.
7. Narrative of some Passages in the Life History of Eenoolooapek, Edinb. 1841, p. 18.
8. Archaeolog. Americana, vol. i., p. 344.
9. Prehistoric Man, 1. Ed., p. 384, and V. Pres. Ad. Am. Ass., Mont., 1882, p. 541. Preh Man, Vol. ii., p. 447, Ed. 1862.
10. How the Earth was Peopled, p. 244.
11. Migration from Shinar, 1879, p. 95.
12. Fossil Men, p. 279.
13. The Human Race, Eng. Ed., p. 460.
14. Mélanges Altaïques, p. 153.
15. Völkerkunde, S. 396.
16. Vocab. Franç.-Esq., 1876, p. xxx.
17. Amer. Naturalist, xxi, p. 567-75.
18. Journ. Anthrop. Inst., Nov., 1886, p. 200.
19. Prehistoric America, p. 522.
20. Journ. Anthr. Inst , Nov., 1886, p. 200.
21. Our Arctic Province, Alaska and the Seal Islands, 1886.
22. Anthropologie 2e. éd., Paris, 1877, p. 488, cf. W. H. Gilder, Schwatka's Search, 1881, p. 299.
23. Arch. Am., Vol. ii., p. 211. Refd. to also in Chamber's Encyc.
24. Cham. Ency. Article, Esquim. -loc. cit.
25. Phil. Soc. Lond. Journ. Vol. I. (1848), p. 154-166.
26. Races of Mankind Vol. I.
27. On Eskimo Descent. Journ. Anthrop. Inst. iii. p. 104 ; Danish Greenld. 1877, p. 405, Esk. Tales and Trad. p. 11.
28. Tribes of Extreme N. West, Contrib. to Am. Ethn. Vol. i. 102.

Abbot,[1] Aurel Krause,[2] and others share this view. Dr. Abbot[3] as a result of an examination of the flint implements found by him in the glacial drift of the Delaware near Trenton, concludes that it is "easy to realize that the Eskimo at one time dwelt as far south as New Jersey." Nathaniel Holmes[4] views the theory with favour, and A. S. Packard[5] after an investigation of the literary and other sources of information upon the subject of the former southward extension of the Eskimo, thinks it "not improbable that the Eskimo, perhaps the remains of the Palaeolithic people of Europe formerly extended as far as a region defined by the edge of the great moraine; and as the climate assumed its present features moved northward. They were also possibly pushed north by the Indians who may have exterminated them from the coast south of the mouth of the St. Lawrence, the race being acclimatized to the Arctic regions." Aug. R. Grote[6] considers that the Eskimo are "the existing representatives of the men of the American glacial epoch." M. le Dr. A. Bordier[7] says "tout porte donc à croire que les Esquimaux sont descendus à une certaine époque jusqu' à Terre-Neuve, et sans doute même beaucoup plus bas."

Something regarding the southward range of the Eskimo in former times might be gained from the accounts of the early Norse voyagers to America, were it not that such great difference of opinion exists as to the direction and extent of their explorations. Rafn who brought together in his great work[8] the various old Norse sources of information, was of opinion that *Helluland* was Newfoundland, *Markland* Nova Scotia, and *Vinland*, somewhere in the region of the present Rhode Island. Some have even claimed that *Vinland* lay as far south as Virginia.[9] A. J. Weise[10] says that all the old maps of Greenland shew Helluland, Markland and Vinland as regions of that country, and in this opinion he thinks

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1. Rep. of Peabody Museum II. p. 254.
2. Verh. d. Berl. Ges. f. Anthro. Ethn. u. Urgesch., 1886, p. 529.
3. Peabody Museum Report. ii. 1876-8, p. 253.
4. Distrib. of Hum. Race, Trans. St. Louis Acad. of Sci. March 23, 1873, p. 4.
5. Notes on Labrador Eskimo, Am. Nat. 1885, p. 265, 395.
6. On the Peopling of America, Bull. Buff. Soc. Nat. Sci., 1877, Vol. 3, p. 181.
7. Les Esquim. du Jardin d'Acclimat. à Paris, Mém. Soc. d'Anthr. de Paris, 2e. Serie, vol. ii., p. 430, cp. Rink, Tales and Trad. p. 11, Dan. Gd. p. 13. Cf. R. G. Latham, Colonial Ethnology, 1851, p. 151; and Man and his Migrations, p. 124.
8. Antiquitates Americanae. Hafniae 1837, cp. Richardson, Arctic Search, Exped., p. 210.
9. Cp. Brinton Myths of New World, p. 214.
10. Discoveries of America to 1525, 1884, p. 421, p. 38.

that the so-called "Skraellings" were all Eskimos. R. G. Haliburton[1] reviews the evidence produced by Rafn and others and concludes that *Helluland* was North Labrador, *Markland* South Labrador, and *Vinland*, Western Newfoundland. He is inclined to think that the naming of *Vinland* may have been after the manner in which Eric the Red named the ice-bound region, now known as Greenland, there may have been a little romance in the stories of these old Norsemen. He suggests that besides the Eskimo the Norsemen in Newfoundland may have come across some of the Naskapi Indians. Rafn[2] says "Now is to be told what lies opposite Greenland, out from the bay already mentioned. Furdustrandir is the name of a land. There are such hard frosts that it is not habitable as far as known. South of it is *Helluland*, which is called *Skraelling's Land.*" If one will compare the description of the scenery of *Helluland*, the flat stones, the action of the tides, the icy hillocks, the low-wooded, sandy shores, with the account of Labrador given by Kohlmeister and Kmoch[3], who especially mention the flat, slaty stones, the retreat of the tide, and the succession of low-wooded coasts to the desert-like shores of the northern region, he cannot fail to have at least a very strong presumption that *Helluland* was the coast of Labrador, and was then as now *Skraelling's Land*, Eskimo-Land. The descriptions of the savages encountered by the Norsemen accord better with the Eskimo than with any others of the North American aborigines. Their outcries, their dress, their boats, their brandishing their spears, etc., have been recorded by the Norsemen, and the descriptions apply with equal force to the Eskimo of to day: so that while we became acquainted with other natives of America less than 400 years ago, the acquaintance of the historical European with the Inuit of Greenland and Labrador must go back nearly five centuries earlier. That there were Eskimo in *Markland* is evident from the relation of Rafn, "Tha er siglthu af *Vinland*, toku their suthrven vethr, ok hitta tha *Markland* ok funnu thar *Skraelinja* 5; ok var einu skeggjadjr; konur voru 2, börn toö; . . . . their nefndu mothur sina vethilldi ok föthur *Uvaege*."[4] Here at once we recognize in *Uvaege* (the man's name), the *Uviya* (my husband) of the present

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1. A Search in B. N. Amer. for lost colonies of Northmen, etc. Proc. R. Geog. Soc. 1885, p. 25-38.
2. Antiq. Amer. p. 280.
3. Jour. of a Voy. from Okkak on the coast of Labrador to Ungava Bay, etc. Lond. 1814 pp. 21, 53, 56, 50, 27.
4. Antiq. Amer., p. 161. For Itibilik see Amer. Ethnol. Trans., vol. ii, 213.

Greenland dialect, and perhaps other words as well. So that whereever *Markland* was the Norse discoverers found Eskimo there on their arrival. Rafn has also pointed out another Eskimo word brought home by the discoverers of America. In the descriptions of Greenland in the old MSS. occurs the word *Itibiliksfirth*, as the name of a bay or fjord. Now Rafn says that Itibilik is still the Eskimo name for an isthmus, *Itibiliks*firth, being therefore, the fjord of the isthmus.

Dr. Rink, the advocate of the American origin of the Eskimo, from a study of their myths and legends,[1] comes to the conclusion that the interior of Alaska was the cradle of the raçe; a further study of Eskimo dialects[2] has strengthened him in this view, and lately he has given additional arguments from an examination into the development of the kayak and the implements and appliances belonging thereto[3]. The course of Eskimo migration was in the opinion of Dr. Rink[4] much as follows: Their original home was in North-west Alaska, and they probably acquired some knowledge of fishing and hunting from the neighbouring Athabascan tribes, their route thence was across the Alaska Peninsula to the Copper River, where it is to be supposed they met with resistance from the Thlinkit and Athabascan. But their chief line of migration was to the North and East along the unoccupied sea-coast to Baffin's Bay. From this point a new dispersion seems to have taken place, southward to Labrador, and eastward and northward to Greenland. Dr. Rink is inclined to agree with Captain Holmes, the Danish explorer, that the East Greenlanders (or Angmagsaliks), found their way to their present abode by travelling along the unknown north coast. He also thinks that the West Greenlanders passed from Baffin's Bay directly southwards, while at the extreme southern portion of the Peninsula there was developed a mixed race probably containing Norse elements. Dr. Rink further thinks that the " Aleutians,[5] had already separated from the main stock, before the latter arrived at the coast," and that perhaps the original Aleutians had visited and reconnoitred the island annually from the American

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[1] Tales and Trad., p. 11; Danish Gd. p. 405.

[2] Eskimo Dialects, etc. Journ. Anthr. Inst. XV. p. 239-45.

[3] Migr. of Esk. as shown by Develop. of Kayak Impl., Journ. Anth. Inst., 1887, p.

[4] Deutsche geogr. Blätter, Jan. 1887. See also Nature, Jan. 27, 1887.

[5] Eskimo Dialects and Tribes, Journ. Anthrop. Inst. xv., p. 241. See Peschel Races of Man, p. 397.

Continent at a certain season before they finally settled upon them. Peschel[1] seems to doubt whether the Aleutians and Eskimo really belong to the same stock, and Keane[2] considers that they profoundly differ in language. Dr. Rink[3] himself terms them an abnormal offshoot. He does not consider it impossible however, that after the passage into Asia of some portion of the primitive Eskimo stock, some tribes may have migrated back again to the American coast. A. H. Markham[4] (who however holds to the theory of Asiatic origin of the Eskimo), thought that a distinct line of migration could be traced from Siberia, along the icy shores and islets of the Polar Sea to Greenland. There is however no great necessity to assume such migration. Lieut. Ray,[5] noting that it is not reasonable to suppose that, had the immigration come from Asia, they would have abandoned the deer upon crossing the straits, sketches the route of Eskimo migration as follows:—"The sea-shore led them along the Labrador and Greenland coasts; Hudson's Bay and its tributary waters carried its quota towards Booth's Land; helped by Back's Great Fish River the Mackenzie carried them to the N.W. coast, and down the Yukon they came to people the shores of Norton Sound, and along the coast to Cape Prince of Wales. They occupied some of the coast to the south of the mouth of the Yukon and a few drifted across Behring's Straits on the ice." Lieut. Ray says, "that the ancestors of the people of Pt. Barrow had made it their home for ages, is conclusively shown by the ruins of ancient villages and winter huts along the seashore, and in the interior." The investigations of Dall[6] and others in the Caves of the Aleutian Islands would seem to lead to a similar conclusion. Dr. Aurel Krause,[7] after journeying in the Eskimo territories observes, "Bemerkt man die gegenwärtige Verbreitung der Eskimos in Asien, wird man der Ansicht von Dall und Nordkensiold beistimmen, dass die asiatischen Eskimos aus Amerika eingewandert sind und nicht, wie Steller und andere vermuthen, zurück-

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1. Races of Man, 1882. N.Y. Ed., p. 397.
2. Nature, Jan. 27, 1887.
3. Vide Nature, Jan. 27, 1887.
4. Orig. and Migr. of Gd. Esk., Jour. Roy. Geog. Soc., vol. xxvi., 1865, pp. 87-99.
5. Rep. of Intern. Polar Exp. to Pt. Barrow, Alaska. Wash. 1885. See also Scott. Geog. Mag. May 1886.
6. Prehist. Remains in the Aleut. Is., 1873. See also Alph. Pinart, La Caverne d'Aknanh, île d'Ounga., 1875.
7. Die Bevölkerungsverhältnisse der Tschuktschischen Halbinsel, Verh. der Berl. Gesell. für Anthr. Ethn. u. Urgesch., 1883, p. 529.

gebliebene Reste einer ehemaligen zahlreicheren nach Amerika hinüber gezogen Bevölkerung." The number of the Asiatic Eskimo, including those of St. Lawence and Diomede Islands was about 2000. The Chukluk or Yuit in his opinion undoubtedly belong to the Eskimo stock and have wandered across the straits from America. They wandered southwards and in 1879 had reached as far as Cape Olintorsk. The sea-coast of the Thcuktchi Peninsula from Point Tchaplin to the Anadyr, as well as parts of the East Coast are peopled by Eskimo, called Namollo by Lütke, Tuski by Hooper and Dall, and by themselves at Ithygane (or Chukluk), Chuklukmut. Dr. Carl Neumann[1] says that the Asiatic Eskimo or Tchouktchis retain a distinct recollection of the fact that their forefathers crossed the Straits from America

Dr. Franz Boas,[2] who for some time resided among the Eskimo of the Cumberland Sound and Baffin's Land region, and had especial opportunities of studying their habits, legends, language, etc., concludes, "Durch diese Thatsachen gewinnen wir den Eindruck, dass die früheren Formen der Sagen sich westlich von Baffin's Bay finden, was auf eine Verbreitung der Eskimos über den Smith-Sund schliessen lässt. Verbinden wir dieses mit dem Umstande, dass die Sagen der Ungava Eskimos stets nach Norden über die Hudson Strasse verlegt werden, dass man in Baffin Land stets über die Fury und Hecla Strasse fort nach Süden als dem Schauplatz alter Sagen hinweist, und, dass die westlichen Eskimos ebenso den Osten als das Land ihrer sagenhaften Helden und Stämme betrachten, so gewinnt die Vermuthung an Wahrscheinlichkeit, dass im Westen des Hudson-Bay Gebietes, die Heimath der weitverbreiteten Stämme ist." In the West, then, of the Hudson's Bay region, was according to Dr. Boaz the home of the primitive Eskimo Race; they crossed Fury and Hecla Straits from the South; thence a portion of the migrating tribes turned southwards and peopled Labrador, whilst another journeyed towards the North and reached Greenland. Dr. Boaz thinks that after Greeley's discoveries at Lake Hazen, there is no longer room for doubt, that the great extent of territory in that direction was once peopled throughout by Eskimo; he also inclines to the opinion that the East Greenlanders[3] reached their present habitat by migrating around the northern part of the island-continent of Greenland. The migration of the Western Eskimo along the sea-coasts and water-courses to their present positions, is susceptible of reasonable explanation on Dr. Boas' theory. He divides the Eskimo stock, generally as follows: I. Eastern, the Eskimo of Hudson's Bay, Baffin Land, Greenland and Labrador; II. Central, on the north coast from King William's Land to Cape Bathurst; III. Western, from the Mackenzie westwards. The theory of Dr. Boas would go far to explain many things that are left untouched by the theory advanced by Dr. Rink, though both agree in the fundamental idea of American origin for the Eskimo. If we combine the idea of the western Hudson's Bay region, as the seat of the primitive Eskimo stock, with that advanced by Horatio Hale, that "the course of migration of the Huron-Cherokee family has been from the north-east to the south-west, *i.e.*, from Eastern Canada on the Lower St. Lawrence to the mountains of Northern Alabama,"[1] and that consequently their primitive abode must have been in the region of Labrador and the Gulf, we get an interesting situation. South of the primitive Eskimo, and Huron-Cherokee families, lay in all probability the Mound-builders. It is but reasonable to suppose that contact with one another took place, and we have proof of this in the vocabularies of these various stocks.

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[1] Dr. C. Neumann's Tchouk. Exped., Transl. by Capt. Clarke, Proc. Roy. Geo. Soc., xxi. p. 217.

[2] Die Sagen der Baffin Land Eskimos, Verh. der Berl. Gesell. für Anthrop. Ethnol. u. Urgesch., 1885, S. 166.

[3] Cf. Rink—Nature, Jan. 27, 1887.

Elsewhere,[2] I have pointed out a few of the Cree and Algonkin loan-words in the Eskimo dialects of the Churchill and Mackenzie. I have since traced them to the shores of Behring's Straits and into Asia, thus confirming Dr. Boas' view of the position of the cradle-land of the Eskimo, and proving that the far-western Eskimo and those of the Churchill and Mackenzie, as well as those of Labrador (for the loan-words are seen there also), must have lived together in juxta-position to the Algonkin stock.

Examples of these loan-words are:—

Algonkin, *nipiy* (water).
Miami *nipanoué* (cold).
Chippeway *nibi* (water), Minsi *nibi*.
Miami *nepeh*, Ottawa *nipish*.
Algonk. *nipa* (die) Cree *nipiw* (dead).
Algonk. *nipouin* (death) *nipan* (sleep).
Lenapé *nipaoui* (by night).

Penobscot *nipongi* (night).
Mass. *nippe* (water) Nanticoke *nip*.
Narrag. *nepouckttow* (to kill).
Chippeway *niba* (sleep).
Mohican *nup* (die) Narrag. *nippitchew*.
Penob. *neebunst* (moon), Montaug *neepa*.

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[1] Ind. Migr. as evidenced by Language, p. 11.

[2] Science, Sep. 2, 1887.

Mack. River Esk. *nipaluk* (rain).
Labrador, *niptar-pok* (foggy).
Tchuakkak I. *nüptschuku* (rain).
Anadyr Tchuktschi, *neptschuk* (rain).
Church. River Esk., *nipa* (dead).
Mack. " " *nipta-toark* (quarter, moon's).
Malemute, *niptiga* (night).
Ch. R., *nipalukuni* (to rain).
Mack. R. *nipaluktoark* (to rain).
Cumb. Sound. *nepewoke* (sunset).
Mack. River, *nipiyork* (sunset).
" " *nipiyoark* (to set, of stars).

And doubtless, a more thorough examination, which I have the intention, though not at present the leisure to make, will result in additions to the short list given above. The far western Eskimo seem to have come into contact with Aztec-speaking races, for in their vocabularies we find traces of this, *e.g.*:

Aztec, *metztli* (moon).
Tarahamara, *maitsaca.*
Cora, *matzakere*, Cahita, *mecha.*
Anadyr Tchuktschi, *matschak* (sun).
Kotz. Sound, *maje* (sun).
Kadiak, *madzak* (star).

Dr. Rink[1] tells of a legend regarding the procuring of Copper by the Eskimo from inland tribes to the south. Now, with the primitive Eskimo stock situated to the west of Hudson's Bay, from what people would the Eskimo be likely to borrow their copper? From the Mound-builders, we may reasonably suppose. Now the word for copper in the various Eskimo dialects is, *Kanooyak* (Hudson Bay), *Kannoyark* (Mack. R.), *Kannujak* (Unalaska), *Kanuja* (Kadiak), *Kanuak*, *Kennijak*, (Tchugaz), and in Mohawk we find the word for copper to be *quennies*, in Iroquois *kanadzia.* May not the ancestors of the Mohawk and Iroquois have borrowed this word from the copper-using people the Mound-builders? and may not the Eskimo have done the same? Perhaps the Eskimo as Mr. Dall[2] once hinted, were related to the Mound-builders. Now in Japanese the word for copper is *aka-gane* (red-metal) and the word for metal is *gane* or *kane.* In the appended comparative vocabulary of Eskimo and Turanian dialects, there are about 100 Japanese words, for which equivalents are to be found in the various Eskimo dialects. And there seems to be some similarity between the Japanese and those American dialects which belong to the region adjacent to the habitat of the Mound-builders, so that it would not be strange if the Japanese in addition to being kinsmen of the Eskimo, were nearly related to the people of the Mounds, or were even their descendants; perhaps the first emigrants from the Mound-builders' land, harassed by less settled and more warlike tribes. The appended list of words common to

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[1] Tales and Trad. of Eskimo, 1875, p. 108.

[2] Proc. Am. Ass. Adv. Sci. 1869.

Eskimo and various Indian dialects gives evidence of ancient and long existing relations between the Eskimo and the more southern tribes of America aborigines.

To return to the theory of an Asiatic origin for the Eskimo. Peschel[1] says, "The identity of their language with that of the Namollo, their skill on the sea, their domestication of the dogs, their use of the sledge, the Mongolian type of their faces, their capacity for higher civilization, are sufficient reason for answering the question whether a migration took place from Asia to America, or inversely from America to Asia in favour of the former alternative." He concludes that this migration took place "much later than the first colonization of the New World from the Old." He further says that in historical times the migrations have been in an easterly direction. The Aleutian he thinks are connected with the Eskimo "only by a number of words common to both, which may, however, have been merely interchanged, in other respects their language is isolated."[2] Topinard,[3] gives his opinion as follows, "La dolichocéphalie et l'extrême hauteur de crâne (du type eskimau) diminuent en se rapprochant du détroit de Behring. Les Aléoutes et les Koloches formeraient le passage entre lui et le type samoyède ou le type mongol." V. Henry,[4] assuming the correctness of the Asiatic theory of Eskimo origins, thinks, "l'Aléoute, serait probablement l'anneau de transition qui allierait ensemble le samoyède et l'Eskimau, langues au premier abord, si dissemblables." A few years before, M. Henry had rejected the theory of the relationship of the Innuit languages with those of the Ural-Altaic group as utterly untenable.[5]

A great deal has been made of the so-called "Mongolian aspect" of the Eskimo. Peschel says they are often mistaken for Chinese or Japanese, and Aleuts, Petitot[6] observes "rien ne ressemble plus à un Esquimau et à un Groenlandais qu'un Koriak, un Ostiak, un Samoiède," and Figuier[7] is of the same opinion. Dr. P. Penhallow[8] compares the Eskimo with the Ainos, and suggests that the latter may have reached America. H. W. Elliott[1] detects a striking resemblance between the Aleuts and the Japanese, regarding the former as a connecting link between the latter and the Eskimo. Prof. Flowers[2] discusses the matter in these terms:

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[1] Races of Man, p. 391.
[2] Loc. cit. p. 397.
[3] Anthropologie, 2e Ed. 1877. p. 488.
[4] Esquisse d une Grammaire raisonnée de la langue aleoute, Paris 1879, p. 3.
[5] Esquisse d'une grammaire innok., Rev. de Ling., Nov.-Dec. 1877, p. 224.
[6] Loc. cit., p. 391.
[7] Voc. Franç. Esquim. 1876, p. xxv.
[8] Human Race, p. 243.

"The special characteristics which distinguish a Japanese from the average of mankind are seen in the Eskimo in an exaggerated degree so that there can be no doubt of their being derived from the same stock." Claiming that this exaggeration decreases as we progress from east to west in the Eskimo territory, he derives the Eskimo from the Mongols of Asia, represented by the Japanese. A. H. Keane[3] reviewing Dr. Rink's paper on the Eskimo dialects, referred to above, notices the views advanced by Prof. Flowers and Mr. Elliott. He points out that the Japanese are but comparatively recent intruders into Yesso (having been preceded by the Ainos), and could hardly have had time to throw off a branch which should have developed into so specialized a people as the Eskimo, and inclines to favour the opinion of Dr. Rink. Petroff[4] opposes Dr. Rink's theory and considers that the Eskimo moved southwards after the invention of the Kayak. Turner criticises Dr. Rink's general views and his opinion regarding the development of the Kayak implements and their bearing upon Eskimo migrations, but does not advance any very striking arguments. At the present time the Asiatic origin theory first set forth by Crantz, the historian of Greenland, seems to be fast losing ground and the American theory in proportion gaining in popular favor.

A few words as to the Eskimo legends regarding their own migrations. The Asiatic Eskimo are said by Dr. C. Neumann[5] to retain a distinct recollection of the passage of their forefathers from America in times long past. Murdoch[6] comparing the story of *Kokpausina* as told by the Pt. Barrow Eskimo, with that of *Kagssuk* as given by Rink, says "if Kokpausina and Kagssuk were real beings, it is probable that they were the same men, and lived not in the locality now pointed out, but in the common home of the prehistoric Eskimo; before the Greenlander started on the weary journey towards the

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1. Our Arctic Province, Alaska and the Seal Islands, p. 173.
2. Presid. Addr. Anthrop. Inst., Jan. 9, 1885.
3. Nature, Jan. 27, 1887.
4. Am. Nat., vol. xxi, p. 567-75, and Smithson. Report, 1882, p. 646.
5. Proc. Roy. Geog. Soc. xxi. (1876-7), p. 217.
6. A few Legend. Fragm. of Pt. Barrow Esk. Am. Nat., July, 1886, p. 596.

east, and the men of Pt. Barrow on their perhaps longer journey towards the setting sun."[1] Dr. Boas[2] says that the western Eskimo regard the east as the land of their legendary heroes and races. Kohlmeister and Kmoch[3] state that there is a legend to the effect that the Greenlanders were once inhabitants of Labrador, and certain remains there existing have been assigned to them. There is also a legend that the Greenlanders ultimately came from Canada.[4] Ross[5] relates that the south Greenlanders believe that they came from the north, and when Sacheme the interpreter to the expedition, saw the Arctic Highlanders, he exclaimed, "these are the right Esquimaux, these are our fathers." Considering the isolation in which some Eskimo communities live, it is truly wonderful that they should have retained a recollection of their relations, and adventures in the distant past. Ross[6] states that the Arctic Highlanders seem to have thought themselves the only men in the world, and that except their habitat, the whole universe was ice, sea and mountains. M. Hansen-Blangsted[7] says that the majority of the Eskimo of Angmagsalik (in East Greenland) have never visited the western coast. The Eskimo of Greenland and Labrador seem scarcely to have had any intercourse at all. Indeed, Dr. Rink[8] is of opinion that the inhabitants of Cape Farewell and Labrador have had no intercourse with each other for upwards of a thousand years.

Most of the Eskimo communities, like many other primitive races, have a legend regarding an ancient paradise, which their forefathers inhabited in the dim past. Petitot[9] observes respecting this:—"*Naterovik* est pour les Tchiglit, ce qu' est *Akilinerk* pour les Groenlandais et *Nunatagmun* pour les Esquimaux centraux. Si les Groenlandais ont conservé le souvenir d'Akilinerk, c' est que la dernière étape, sinon le berceau de leurs pères fut le détroit de Behring et les rivages compris entre ce parage et le Cap des Glaces." Further investigation is required before the exact import of this legend can be ascertained, or the question settled, whether the *Akillinek* of the Greenland Eskimo, the *Nunatagmun* of the people of the central regions, and the *Nateroik* of the Tchiglit of the Mackenzie, refer to specific localities, or are mere figments of the savage imagination. Dr. Rink[1] thinks that Akillinek is perhaps the Asiatic side of Behring's Straits, to which expeditions from the American shore may have taken place. Murdoch[2] compares with the legend of *Akillinek*, the Pt. Barrow legend of the country of *Iglu-Nuna* discovered by a man who had lost his way when out sledging. I might here remark that Killinek is still the Eskimo name for Cape Chudley and the adjacent islands.

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[1] Loc. cit. p. 597.

[2] Die Sagen der Baffin Land Esk., Verhl. der Berl. Gesell. f. Anthr. Ethn. u. Urgesch., 1885 S. 165.

[3] Loc. cit., p. 37.

[4] Kohlmeister and Kmoch, Loc. Cit., p. 37.

[5] Voy. of Disc. f. purp. of Expl. Baffin Bay, etc., 2nd. Ed. 1819, vol. i., p. 149.

[6] Voy. of Disc. for purpose of Expl. Baff. Bay, etc., 2nd. Ed., Lond., 1819, vol. i., p. 166.

[7] Soc. de Géog. de Paris, Compt. Rend., 1885, p. 542.

[8] Journ. Anthr. Instit., vol. iii. p. 105.

[9] Voc. Franç. Esquim., p. xxv.

In a paper read before the Institute last year,[3] I advanced the view that instead of the Eskimo being derived from the Mongolians of North-Eastern Asia, the latter are on the contrary descended from the Eskimo, or their ancestors, who have from time immemorial inhabited the continent of America. Since then I have been enabled to collect a comparative vocabulary of some 200 words, exhibiting the relationship between the Eskimo dialects and the Turanian languages of Northern Asia and Europe. I am sure the vocabulary could have been greatly extended if I had had more time and more material to work upon. Still I think that a vocabulary of 200 words will seem a sufficient justification for the position I have taken. Together with the list of words will be found some examples of similarity in grammatical structure, between the language-groups considered. The apparent great age of the residence of the so-called "Mongolian" peoples in Asia and in Europe, may at first sight seem adverse to the opinions I have advanced. From language, from craniology and from archæology, I have drawn what seem to me reasonable inferences. H. H. Howarth[4] thinks that "the Finns proper entered Scandinavia in the wake of the Norsemen," and others have remarked that the Finns are among the latest comers from Asia. The true form of the Eskimo skull is *dolichocephalic*[5]; and the dolichocephaly decreases as we proceed from Greenland westwards into Asia. Among the kindred Turanian tribes of Asia and Europe, this type has to a consider-

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1. Eskimo Tales and Trad., p. 29.
2. Loc. cit., p. 598.
3. Proc. Can. Inst., 3rd. Ser., vol. v., Fasc. i., Oct. 1887, p. 70.
4. The Finns, Journ. Anthr. Inst., vol. ii., p. 208.
5. Rae. Eskimo Skulls, Journ. Anthr. Inst., Gt. Brit. and Ire.. vol. vii. 1879-8, p. 142.

able extent vanished, especially among the Lapps, Wotiaks, Esths, Magyars, etc., perhaps through intermingling with other races. The Ostiaks and Woguls are, however, according to Baer and Dr. Europæus,[1] dolichocephalic, a fact noted before by Humboldt, and since, by A. H. Keane. The migration of the Turanians now in Europe, can with reason, be traced back to the region of the *Altai* in Asia. A. H. Keane[2] remarks, *Lake Baikal* itself seems to have been indicated as a sort of point of dispersion of the Lapp Race. H. H. Howorth,[3] gives the following names in the region of the Obi and Yenesei, as proof of the migration of the Finns :—*Ishma* (river-name ; Finnish, *Isoma*), *Tsylma* (river-name, Finnish *Kylma*, with which might be compared *Kolyma* in N. E. Siberia), *Pjosch* a (river-name, Finnish *Pesa*), *Kuloi* (river-name, means fish-river, cf. *Kolyma*). And Ujfalvy de Mezokovezd[4] says, " Dans les bassins de l'Irtyche, de l'Obi, et du Yenesei, les noms d'origine finnoise abondent," and he cites as examples the following :—*Kem* (the name given by the Tartars to the Yenesei, cf. the *Kemi* in Finland, the *Kemi* in Olonetz, and the *Kama* in Permia, with which I venture to compare, *Kamanek*, ' lake ' in Churchill River Eskimo and *Kragmalik*, *Kragmalvik*, the names of the Rivers Anderson and McFarlane in the Tchiglit, or Mackenzie River dialect); *sym* (*symo* in Finland); *ija* [in Finland *oji* and *yoki*, with which compare *kuk* (Gd.), *kuuk* (Ch. R.), *koouk* (Kotz. Sd.), *coke* (Malemute), river]; *Koloa* (fish-river, frequently met with in Finland, Permia, and Archangel, and in *Kolyma*, bordering on the Eskimo region in N. E. Siberia, cf. *khalloo* Kotz. Sd., fish); that they should have come over from America in the prehistoric past, seems then a reasonable explanation.

With the Eskimo tribes of North America, it is common to find the designations of local divisions, communities, or tribes so-called, ending in *-meut*, *-meut*, *-mio*, *-meork*, which termination Petitot[5] says marks residence or habitation, *e.g.*, *Kuskwogmute*, a dweller on the Kuskwoquim River, *Chukklukmeut*, an inhabitant of Chukluk. It is interesting to find this suffix in Asia. H. H. Howorth[6] speaks of the root *mard* or *murd*, as in *Mord*-win, and *Komi-mort*, both meaning *near*. He says,[1] " the root of Votiak is Vot or Vod; the indigenous name is *Udemurt;* the Permians call themselves *Komy-mort* (*i.e.*, dwellers on the Kama), and the Siranians living further east also call themselves *Kouy-mort.*" With this ethnic or rather locative suffix, may be compared the Samojed word, *muat*, *miat*, house. Taking all the evidence into consideration, it seems to me that the dolichocephalic ancestors of the Eskimo of America were also the ancestors of the Turanians of Northern Asia, and that the course of migration was from America westward along Siberia into Europe; the Eskimo ancestors being probably derived from Europe in early prehistoric times, although much might be said in favor of making America the scene of the development of that peculiar variety of man now represented by the Eskimo, and of considering palæolithic man in Europe an offshoot from this stock. The ocean, which in Pliocene times, probably covered the north of the present continent of Asia, may be sufficient to explain some of the movements of the Asiatic Turanians and their comparatively late intrusion into Europe.

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[1] Zeitschrift für Ethnologie, Berlin, 1876, p. 81-88.

[2] The Lapps, their Origin, etc., Journ. Anthr. Inst. xv., p. 217.

[3] The Finns, Journ. Anthr. Inst., vol. ii., p. 192.

[4] Mélanges Altaiques, p. 51.

[5] Voc. Français.-Esquim. 1876, p. liv., and Bull. Soc. d'Anthr. de Paris vii., p. 219.

[6] Bulgarians, Journ. Anthr. Inst. iii., p. 29.

I do not intend to discuss the folklore and mythology of the Turanians in comparison with the Eskimo, and shall, therefore, content myself with pointing out a single remarkable coincidence. Dr. Rink,[2] gives the Eskimo legend of the origin of the white man, as the offspring of a union between a woman and a dog. This is the Greenland tradition according to Egede.[3] A similar story is reported by Mr. Murdoch[4] from Pt. Barrow. Now it is interesting to find that the Japanese account for the origin of their predecessors, the Ainos, in a similar manner.

Baron Nordenskiold,[5] the eminent Swedish explorer, thinks that " the Eskimo might probably be the *true autocthones of the Polar Regions*, *i.e.*, they had inhabited the same previous to the Glacial Age, at a period when a climate prevailed here equal to that of northern Italy at present, as proved by the fossils found in Spitzbergen and Greenland." Nordenskiold further states that " if it could be proved that the Eskimo descended from a race which inhabited the Polar Regions in the very earliest times, we should be obliged to assume that there was a Northern (Polar) as well as Asiatic cradle of the human race, which would open up new fields of research both to the philologist and to the ethnologist, and probably remnants of the culture and language of the original race might be traced in the present Polar inhabitants of both Europe and Asia." The culture of the Eskimo, according to Nordenskiold, proved a gradual development through ages whilst they had no contact with other races.

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[1] The Finns Journ. Anthr. Inst. vol. ii., p. 217, and p. 211.

[2] Esk. Tales and Trad., p. 147.

[3] Groenland, p. 195.

[4] Loc. cit., p. 594. Cp. the legend of origin of the Tchugazzie in Richardson Arctic Search. Exped. p. 215, 239.

[5] Geogr. Soc. of Stockholm. Feb. 20, 1885. Summarized in Pro. Roy. Geog. Soc., New Series vii., 1885. p. 402-3.

The Eskimo, being "the only population indubitably common to the two worlds, the Old and the New," it may not, therefore, seem strange that some should have seen in them not recent immigrants into America from the neighbouring Asiatic continent, but kinsmen, perhaps, descendants of the hunters of the Caves and River Drift of the Palaeolithic period in Europe, who have left marked traces of their sojourn in Britain, in France and elsewhere in Western Europe. Prof. Boyd Dawkins, in 1866,[1] was the first to suggest a possible connection between the man of the river drift and the Arctic tribes of America. In his subsequent works[2] he has set forth his views at greater length and with considerable force of argument. His views have to a considerable extent been accepted by Sir John Lubbock,[3] Dr. Beddoe,[4] and other European scientists, while the companion theory which (as advanced by Dr. C. C. Abbot[5]) identifies the Eskimo with the palaeolithic man of the Delaware river in New Jersey has been received in America. Dr. Geikie[6] and Robt. Ellis[7] call for further evidence before giving in their adhesion to the theory of Prof. Boyd Dawkins. Prof. Flower[8] (who looks on the Eskimo as a branch of the North Asiatic Mongols) and Dr. Jno. Rae,[9] think they are "in no way related to the ancient cave men." A. H. Keane,[10] noting the difference in skull, type, etc., between the

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[1] Eskimo in the south of Gaul. Saturday Review, Dec. 8, 1886.

[2] Cave Hunting, 1874, p. 355-9, Early Man in Europe, 1880, p. 203.

[3] Prehistoric Times, 1870, p. 359.

[4] Stature and Bulk of Man in Britain.

[5] Peab. Mus. Report II. p. 25. cf. Prof. E. W. Claypole in Trans. Edinb. Geol. Soc. Vol. V. p. iii. 1887. p. 441.

[6] Prehistoric Europe, p. 547-9.

[7] Sources of the Basque and Etruscan Languages, 1886, p. 49, Note.

[8, 9] Journ. Anthr. Inst. Gt. Brit. and Ire. Nov. 1886, p. 200.

[10] The Lapps, Journ. Anthr. Inst. xv. p. 321.

Eskimo and the Lapps, thinks that "if these peoples were originally one, the Eskimo have remained far truer to the type of the men of the oldest stone age," and that "Prof. Dawkins is so far justified in affiliating or at least comparing the first known inhabitants of Europe, the men of the caves, not with the Lapps, but with the Eskimo." Sir Daniel Wilson[1] is of opinion that "it is impossible to look on casts of the large and finely developed Cro-Magnon skull now in my possesion, without being struck with the extreme contrast between them and the Eskimo." And the height of the Cro-magnon man has been held to be an objection to Prof. Dawkins' view. But the Cro-magnon specimen is probably an exaggerated one, just as we find a considerable difference between the Eskimo of the extreme West and East in height and other respects, the truth being most probably as Dr. Mattei[2] observes, "Quant à la taille de ces hommes primitifs, elle était petite ou moyenne, quoique le squelette de Cro-Magnon offre un exemple de taille assez élevée." Rolleston[3] concludes an article on the Prehistoric Crania of Britain in the following words, "There are many reasons for supposing that the Eskimo are a race which still retains and preserves for us, in the structure and gramtical peculiarities of its language, its life history, and physical peculiarities, *the very closest likeness* to what we believe some of the earliest races of mankind must have been." M. Mortillet[4] considers that the Greenlanders are descended from the men whose remains of the palaeolithic epoch are found at La Madelaine in France, agreeing with Prof. Dawkins. Rolleston[5] and Broca[6] have noted the correspondence of the Eskimo nasal index to that of prehistoric European skulls, and Cleland[7] and Rolleston[8] have called attention to the elongation of the basicranial axis. Prof. E. D. Cope[9] accounts for appearance of tritubercular molars in certain Western European races, by reference to the theory of Prof. Body Dawkins, as such dentition

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1. Add. of Sir Daniel Wilson, LL.D., Vice-Pres. Sec. H. Am. Ass. Adv. Sci., Montreal, 1882, p. 532. See also "the fancy of an Eskimo pedigree for European Palaeolithic Man." Proc. and Trans. Roy. Assoc. of Canada, Vol. I. (1882-3) p. 57.
2. Les anciens peuples de l'Europe centrale. Mem. de la Soc. d'Anthr. de Paris II. Ser. T. 1.
3. Scientific Papers. (Ed. by Turner, 1884) Vol. I. p. 320. [p. 431.
4. Les Groenlandais descendants des Magdaléniens. Soc. d'Anthr. de Paris, 1885. pp. 868-870.
5. Loc. cit. p. 11.
6. Revue d'Anthrop. 1873. II. p. 191.
7. Philosophical Transactions, 1870, p. 124.
8. Loc. cit. p. 191.
9. On Lemurine Reversion in Human Dentition, Amer. Nat., Nov. 1886. p. 947.

is very frequent amongst the Eskimo. Samuel Laing[1] compares the skulls of the early stone period in Scandinavia with those of the Eskimo, and Richard Owen,[2] speaking of crania from the Shetland Islands observes that they "combine Teutonic features with the roof-shaped calvarium[3] and supra-nasal depression of the Eskimo." H. G. M. Murray Aynsley thinks that "the race that lived in the Stone-age is represented now by the Finns, the Lapps and the Eskimo," and compares them in regard to colour, eyes, physical appearance, etc., with the aborigines of the Spiti valley in the Himalayas.[4] Broca[5] remarks the resemblance of the dolichocephalism of the race of Canstadt to that of the Eskimo. The correspondence of the weapons of the men of the River-drift to those at present in use amongst the Eskimo has been shown by Professor Dawkins,[6] who has also noted the peculiar aptitude for carving or scratching drawings on bone, which the relics of the Cave-men show them to have possessed, and with which the Eskimo are gifted to a remarkable degree. It seems to me therefore that there is nothing absolutely conclusive against Prof. Dawkins' theory, which enables us to solve many problems otherwise inexplicable.

The exact relation which exists between the Eskimo race and the various other aboriginal stocks of the American continent, has not yet been satisfactorily determined. That the Eskimo and some of the Indian races of North America, have been brought into contact in the remote past, I have, I think reasonably shown ; whether they have sprung from the same original stock, remains an open question. The measurements of Eskimo skulls bear a remarkable resemblance to those of prehistoric Crania from California and Brazil. The series of crania from Sta. Barbara Islands and the vicinity, as seen from the following table,[7] approach in some respects, Eskimo skulls very closely :—

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1. Journal Anthrop. Soc., 1865. p. 21.
2. Ib. p. 54.
3. Asiatic Symbolism, Indian Antiquary, Bombay, March 1886, p. 61.
4. Ib. p. 63.
5. Disc. de M. Broca. Prés. de l'Ass. franç. p. l'Av. d. l. Sci., Havre 1877.
6. Loc. cit.
7. Peabody Mus., Rep. ii., 1876-9, p. 568.

LOCALITY.	LENGTH.	BREADTH.	HEIGHT.
Mean of 103 Sta. Barbara Crania	175	136	129
" " 50 fr. islands near St. B	184	133	128
" " Esquimaux	184	132	138
" " Tchuktchi	176	135	137
" " 6 from Sta. Catalina	189	133	130
9 crania from Sta. Clementina I.	186	137	131
46 " " " Cruz I.	179	135	125
" " " Barbara	178	136	131

The orbital index of the Botocudos according to Canestrini[1] brings them closely in relation with the Eskimo and separates them from the other American tribes. The description given by Ten Kate[2] (who compares them to skulls from Lower California), of the crania of Lagoa Santa in Brazil seems to invite comparison with the Eskimo. A. H. Keane[3] says Augustine St. Hilaire was much impressed by the likeness of the Botocudos to the Chinese, and Peschel[4] and others have discerned a likeness between the latter and the Eskimo. The Botocudo cranium, says Keane,[5] "is distinctly dolichocephalic, with a mean index of 73.30 for males and 74 for females (extremes 71 to 79)," and Peixoto,[6] allies the Botocudo skull to that of the man of Lagoa Santa. The mesorrhine nasal index of the Eskimo approaches them to the skulls from Sta. Cruz Is. (49), Sta. Barbara, mainland (48), Sta. Clementina (47), Sta. Catalina (49), and the Botocudos (46.76). The average contents in cubic centimetres of Eskimo skulls given by Schaffhausen (1391) and by Morton (1410), brings them in relation with the Botocudos (1359), and the Araucanians (1402).[7]

These and other considerations, such as the frequency of the oblique so-called "Mongoloid" eyes among the aborigines of Antioquia[8] (Venezuela), and elsewhere, might lead one to the belief that at a very remote period, the people now represented by the Eskimo, may have also ranged over part at least of the South American continent, being perhaps its earliest inhabitants and allied to the cave-men of Europe. And some of their descendants may yet exist, amongst the Botocudos and other low tribes of Brazil, or even in that still lower race the Fuegians. Dr. Virchow,[1] observes with reference to the discovery in Patagonia of a human skull beside the remains of a Glyptodon, "Ich habe auch schon hin gewiesen, dass die von Herrn Strobel in den Paradeus von Patagonien gefundenen Schädel, gleichfalls brachycephal waren; sind seine (die des Horrn Roth in der Pampa) Fundangaben richtig, was zu bezweifeln, kein Grund vorliegt, so dürfte mit Sicherheit folgen, dass schon diese älteste Bevölkerung brachycephal war." Considering these facts, it may be, that in South America, as in Europe, we have presented to us in the past the spectacle of an earlier dolichocephalic race, intruded upon and displaced by a contemporary, or rather a later and brachycephalic people. Presupposing this earlier dolichocephalic, Eskimo-like race in North and South America, and admitting the arrival at later intervals of Iberian immigration from Europe and Northern Africa, have we not found a reasonable explanation for many of the facts which meet us in the pre-history of America?

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[1] Atti della Soc. ven. trent. di Sci. Nat. a Padova, 1880, vi. 2.

[2] Bull. Soc. d' Anthr. de Paris, Tome. 8, iii. Sér., Fasc. 2, 1885, p. 240.

[3] Journ. Anthr. Inst., 1884, p. 204.

[4] Races of Man, p. 39.

[5] Loc. cit., p. 211.

[6] Novos Estudios sobre os Botocudos, Rio Janeiro, 1882.

[7] Measurements given by O. T. Mason, Rep. Smithson. Inst. 1885, pt. i., p. 82.

[8] See the plates given by Dr. André Posado Aranzo—Sur les Aborig. d'Antioquia. Mém. Soc. d' Anthrop. de Paris, ii Sér., Tome i., 1873, p. 231

In historic times intercourse and relations with the American Indians, have entirely ceased in some cases, or varied much according to locality, judging from Dr. Rink.[2] "In the extreme West there has been a slight intermingling with the Thlinkits about the Copper River, and with the Athabascans back of Kotzebue Sound, elsewhere the *Innuit* and *Karalik* (West and East Eskimo) have kept entirely aloof, nowhere amalgamating with the Red Indians." Notwithstanding this, Dr. Rink[3] is inclined to think that "The North-West Indians might be considered as forming an intermediate link between the Eskimo and the inland tribes."

With the Greenlanders, the Indians have long ages ago become fabulous beings, and are known in Legend as *Erkilek*. According to Mr. Murdoch[4] the case is the same at Point Barrow, in Alaska. Mr. Dall[5] states that "the Orarians (Eskimo) are known to the

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[1] Ueber ein mit Glyptodon gefund. mensch. Skelet. aus der Pampa de la Plata. Verh. der Berl. Ges. f. Anthr. Ethn. u. Urg., 1883, S. 467.

[2] Nature, Jan. 27, 1887.

[3] Eskimo Tales and Traditions, p. 71.

[4] Loc. cit., p. 599.

[5] Proc. Am. Ass. Adv. Sci. Salem, 1869, p. 266; Ib. p. 272

Northern Tinneh or Chippewyan Indians as Uskeemé or sorcerers, and a belief exists among all the Indian tribes acquainted with them that they are possessed of supernatural powers." He also remarks that "no intercourse between Eskimos and Indians occurs except in the way of trade; they never intermarry, and in trading use a sort of jargon, neither Indian nor Eskimo." In Alaska there are but few words common to the two languages; two of these are *kweenyuk* (pipe), which the Indians borrowed from the Eskimo; and *tenékuh* (moose) which the Eskimo adopted from the Indian. Kohlmeister and Kmoch[1] state that "the Eskimo (of Labrador) are very much afraid of the Indians who are a more nimble and active race." McFarlane[2] says that "the Eskimo of Anderson's River are very friendly with the Bâtard Loucheux Indians; that the Hare Indians[3] hold the Eskimo in great fear, and are despised by them, in return being called *Nouga* (or spittle). Hind[4] states that "the Naskapies like there allies and friends the Montagnais, hate the Eskimo, whom they never fail to attack when opportunity offers." Dr. Brinton[5] observes, "They (Eskimo) are the connecting link between the races of the Old and New Worlds, in physical appearance and mental traits more allied to the former, but in language betraying their nearer kinship to the latter." Dr. Brinton[6] also calls attention to the fact that the "traditions of the Tuscaroras who placed their arrival on the Virginian coast at about 1300, spoke of the race they found there (called Tacci, or Dogi) as eaters of raw flesh and ignorant of maize. Petitot[7] says that the Innok tradition of the creation, disdains mention of the Indians, and upon questioning the narrator of it, he received this answer, "Oh, il ne vaut pas la peine d'en parler. Ils naquirent aussi dans l'ouest, sur l'île du Castor, des larves de nos poux. C'est pourquoi nous les nommons *Itkréleit*. Ils sont méprisables, mais les *Krablunèt* et les *Innoit* sont frères." Lyon[8] remarks "Of the Indians (Itkaghlie), they (the Eskimo) speak with fear and abhorrence." Richardson[9] says of the Eskimo who dwell to the east of Cape Bathurst, "the reputation of the *Kablunaht* or *Kablunet* (white men) is superior among them to that of the remote tribes of their own nation. With the *Allani-a-wok*, as they term the inland Indians, they have no intercourse whatever."

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[1] Loc. cit., p. 57.

[2] In Hind's Labrador, vol. i., p. 259. [3] Ib. p. 258.

[4] Loc. Cit., vol. ii., p. 101.

[5] Myths of the New World, p. 24. [6] Ib. p. 24.

[7] Voc. Français-Esquim. Monog., p. xxv.

[8] Private Journal of Capt. G. T. Lyon of H.M.S. Hecla. Dur. Voy. of Disc. under Capt. Parry, New Ed. Lond., 1825, p. 346.

[9] Arctic Searching Exped. N. Y. Ed., p. 209.

Wilhelm Herzog[1] has endeavoured to establish a connection between the various languages of the Yuma stock and the Aleut and Eskimo. The resemblance of Old Californian skulls to those of the Eskimo lends this theory probability from other than linguistic evidence.

To Eskimo philology and phonology, the same attention has not been paid, as has been given to many of the languages of more southern tribes of American aborigines. Perhaps this is partly owing to the Eskimo having been so long regarded as a mere offshoot of the North Asiatic Turanians. There is considerable material for research in Eskimo philology, but it does not exist in a form which renders it easy of access to the student. I shall therefore endeavour to advance our study of the Eskimo a step, by presenting alphabetically arranged vocabularies in English of a number of Eskimo dialects, which have been recorded by travellers, explorers and missionaries. A few words of preface with regard to the general character of the Eskimo language may be fitly inserted here. Dr. Brinton[2] has said that the language of the Eskimo "betrays its nearer kinship to the races of the New World," and other writers have expressed a similar opinion. Dr. Rink,[3] observes, "with regard to their language the Eskimo also appear akin to the American nations with regard to its decidedly polysynthetic structure. Here, however, on the other hand we meet with some very remarkable resemblances between the Eskimo idiom, and languages of Siberia belonging to the Altaic or Finnic group, first as to the rule of joining the affixes to the end, and not to the beginning of the word, and second, the very characteristic mode of forming the dual by *k*, and the plural by *t*. Peschel[4] says, "Their (Eskimo) words are always formed by means of suffixes, and so far the method is the same as in the Ural-Altaic group, though the important character, the harmony of the vowels, is wanting in the Innuit language. Although the Eskimo language is in no sense incorporative, it will soon be shown that it is a transition between the Ural-Altaic and the American types." Peschel gives the following example to illustrate his remark about incorporation. The Eskimo would use but a single word to express the idea "he says that you also are going in haste to buy a beautiful knife":—

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[1] Ueber die Verwdsch. des Yumasprst. mit der Sprache der Aleuten u. der Eskimostämme, Zeitschr. f. Ethnologie, Bd. x., S. 449, Berlin, 1878.

[2] Myths of the New World, p. 24.

[3] Tales and Traditions of Eskimo, p. 74.

[4] Races of Man, p. 395.

sauig - ik - sini - ariartok-asuar-omar - y - otit - tog - og.
knife beautiful to buy go haste will likewise thou also he says.

"But it is most important to note," says Peschel, "that this loose combination of roots is not incorporation, for in the American languages the connected syllables are always curtailed of some sounds." I have here inserted for comparison with the example given by Peschel, the following:—In Mexican a priest may be addressed as—*notlazomahuizteopixcatâlzin*, a word composed of *no* (my), *tlazontli* (esteemed), *mahuiztic* (revered), *teo-pixqui* (god-keeper), and *tatli* (father).

Gilder[1] makes a remark similar to that of Peschel, that the Eskimo language is agglutinative but not incorporating. This is briefly the distinction between the Eskimo and American Indian tongues. Dr. Latham[2] was of opinion the passage between the western Eskimo dialects and those of the neighbouring Indian tribes was comparatively easy; although Mr. Dall[3] has since stated that the Eskimo tongue does not resemble any of the Indian dialects and has but a very few loan words. Wilhelm Herzog[4] has tried with some success to establish a connection between the western Eskimo dialects and the Yuma stock of California. As I have pointed out, the number of coincidences between the Eskimo and those aboriginal Indian tribes of the region adjoining their primitive habitat seems evidence of the extent of their relations in the prehistoric past.

There is a large amount of material for the prosecution of and researches in Eskimo philology, but a good deal of it is yet in manuscript in the Libraries of the Scientific Institutions of the United States. Mr. J. C. Pilling, of Washington, has lately published a Bibliography of the Eskimo language, which when all the works enumerated shall have been published, cannot but give a desirable impulse to the study of American philology. The number of MSS. in this list is very large and gives reason for great hopes for the future progress of science. Mr. Pilling enumerates some 60 Eskimo communities, or tribes, vocabularies of whose dialects have been recorded; some of them it is true but brief lists, but others like those of Fabricius (Greenland) and Petitot (Tchiglit) more properly dictionaries. In his list he enumerates some languages such as the Kamtschatkan and Skitaget, which have not generally been recognised as varieties of Eskimo speech, although in former paper I produced some evidence in favour of the descent of the Kamtschatka tongue from the Eskimo. Mr. Pilling does not mention the short vocabulary of John Davis, from the people of Baffin's Bay, or the short list given by Martin Frobisher of the words of the language of the people of Meta Incognita, perhaps the two earliest records of Eskimo speech.

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[1] Schwatka's Search, 1881, p. 299.
[2] Man and his Migrations, p. 122-3.
[3] Loc. Cit.
[4] Loc. Cit.

A short specimen of the language of Hogarth Sound is given by M'Donald,[1] whose work Mr. Pilling does not appear to have noticed. For this reason I reproduce it here. It is in the form of a letter from the young Eskimo Eenoolooapik, to Mr. Hogarth, dated August 20th, 1840, on board the ship Neptune.

MR. HOGARTH :

Tenudeackbeek mooeput unickpock keimusoomoote Eenoolooapik ackbeelik naluk ackbuckaounenguapekivouck vokiackut petackanoune takoukshoweeokasunga-lara lou-are-bock Ennungite ockpakeluackput Pedluakkpanga Capt. Penny quiluite Innuite unnibouk tawane tanakvanunnane pedluarivanga. EENOOLOOAPIK.

Translation.

MR. HOGARTH :

Eenoolooapik has arrived in Tenudeackbeek and intends to remain at Keimwokssiok. The Innuit say that for many suns the whales were very numerous, but before the ship came they had all disappeared. They also say that the whales will return when the sun becomes low. Capt. Penny has been very kind to me and to many Innuit, who all thank him. Next to him you were the kindest to me, when I was with you. EENOOLOOAPIK.

M'Donald also gives the following Eskimo words scattered passim; *angekuk* (sorcerer); *ackbuck* (whale); *kudloonite* (white man); *nookee* flesh; *meekeouck* (tew); *quinameek* (expresssion of gratitude), *shounook* (bone). To give an idea of the importance of the collection of words "scattered passim," in the works of writers upon one subject, it may be noted that the work of Hall[2] contains no less than one hundred such words, and those of other travellers in proportion. Eskimo proper names form an interesting subject of study, and are of the greatest philological importance. It is to be regretted that some compilers of Bibliographies of languages have not seen fit to pay attention to the names of persons and of geographical features recorded by the various travellers who have written about the Indians. As these names are as much language as the words in the vocabulary, and peculiarly so in the case of primitive people like the Esquimaux, it is difficult to see why they should not have been taken into account when we come to consider the language. In the work of Kohlmeister and Kmoch (referred to above) there are enumerated about 120 such terms, showing the importance of these as a source of linguistic information.

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[1] Narrative of some Passages in the Life History of Enoolooapik, etc., Edinburgh, 1841, p. 18.
[2] With the Esquimaux, 1865.

In the compilation of the accompanying vocabularies considerable care has been exercised and a large extent of ground covered in order to obtain them. For the Greenland vocabulary the authorities are Egede, Cranz, Gallatin, Rink, Ross, (North Greenland) etc. For Hudson's Bay, Gilder and Gallatin; for Labrador, Richardson and R. F. Stupart, whose words from the dialect of Stupart's Bay are marked (S.), besides Gallatin; for the Mackenzie River or Tchiglit dialect the source has been Petitot, from whom also the Churchill River dialect has been extracted and arranged. For the Tchuktschi the sources have been Vater, Klaproth, etc.; for the Aleutian, Buschmann, Henry, etc.; for the Kadiak, Gallatin, Buschmann, etc.; for the Unalaskan, Vater, Buschmann, etc.; for the Tchuakkak, Winter Island, Stuart Island and Nuniwok, Vater, and in the case of Winter Island also Lyon. The Alaskan dialects are from Dall. In the preparation of the comparative Eskimo-Turanian vocabulary, the chief authorities have been, Hepburn's Japanese Dictionary, Oppert's Corean Vocabularies, Batchelor's Ainu Grammar, Scheube's Aino Vocabulary, Klaproth's Sprach-Atlas, Ujfalvy de Mezokovezd Mélanges Altaiques, Singer's Hungarian Grammar, Turkish, Redhouse, for the Turanian languages. For the Eskimo, the vocabularies contained in the works of Klaproth, Buschmann, Vater, Egede, Cranz, Long, Richardson, Ross, Dall, Whymper, Markham, Gilder, Rink, Petitot, etc. The spelling of the various authors has been preserved.

In the comparative vocabularies the numerals (1), (2), in the Tchuktchi column denote that the words belong to the dialect of the Anadyr or to that of the Tchuktchi Promontory respectively. In the Aleutian column the figures (1), (2), (3), denote respectively the Lissic, the Aleuto-Lisgewic and the Lisgewic-Aleuto, of Buschmann. Taken altogether the Eskimo language is one of the most interesting for the philologist and the great extent over which it is spoken and its numerous and isolated dialects make it a subject of the highest importance to linguistic science. When the Eskimo shall have received the same attention at the hands of students of language as have the Semitic, or the Aryan tongues, I trust I am not far wrong in predicting that an important step will have been taken towards the solution of the problem of the origin of language.

The earliest vocabularies of the Eskimo language which we possess are those of Davis ("a few words of the people of Baffin Bay"), and Frobisher ("words of the language of Meta Incognita"), which I here insert alphabetically arranged:—

DAVIS' VOCABULARY.[1]

ENGLISH.	ESKIMO.	ENGLISH.	ESKIMO.
Beard	macuah	Knife, a	sawygmeg
Below	sambah	Leap	conah
Boat, a	ponameg	Live it	unircke
Bracelet, a	sasobneg	Music	madlycoyte
Coat, a	sugnacoon	Needle, a	panygmah
Come down	gounah	No	nugo
Come hither	icune	Nose, a	uderah
Dart, a	asanock, maccoah	Oar, an	paaotyck
Eat some	kesinyoh	Sea, the	aob
Eye, an	blete	Seal, a	ataneg
Fallen down	aba	Sealskin	lethicksaneg
Fish	maatuke	Shot	acu
Fog, a	tucktodo	Skin	lechiksah
Give it me	quoysah	Son, my	ugnera
Go, fetch	aginyoh	Stag or Clan	tuckloak
Go to him	cocah	Thread, a	pignagogah
Harm (I mean no)	yliaoute	Tongue	ugnake
Have (will you-this)	maconmeg	Wash it	myeacoah
Iron	aoh	Yonder	awennyé
Kiss me	canyglow		

FROBISHER'S VOCABULARY.[2]

ENGLISH.	ESKIMO.	ENGLISH.	ESKIMO.
Breeches, a pair of	callagay	Hand, a	argotteyt
Coat, a	attegay	Head, the	mutchatet
Ear, an	chewat	Knife, a	pollenetagay
Eye, an	arered	Leg, a	comagaye
Finger, foremost	teckkere	Nose, a	cangnawe
" fourth	mekellacane	Ship, a	accaskay
" little	yackethronc	Thumb, a	coblone
" middle	ketteckle	Tooth, a	keiotot
Foot, a	atoniagag		

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1. Hakl. Soc., Voyages of Ino., Davis. Lond. 1886, p. 20.
2. Voyages in search of N.W. Passage, Cassel's Nat. Lib., vol. i., no. 32., p. 61.

COMPARATIVE ESKIMO VOCABULARIES.

English.	Greenland. (From Egede and Rink).	Hudson's Bay. (Gilder and Gallatin).	Labrador. (Richardson).	MacKenzie R. (Petitot).	Churchill R. (Petitot).
Arm	tellek	teiejakanak ; teloo ; oksektoo	tallek	talerk	tailek
Arrow	agdligak (bladder arrow)	kakleoke ; kokyoke	karsuk	krarirork, katrok, kukkikrork, kiguvak	kayerok
Autumn	ukiok (winter)	ookeukshark	ookeark (S.)	iyukarktoark	
Axe	ullo (knife)	oolemow ; ooleemar	tiklak (pick axe) ulimaut tukkairgaiok	tukinayork, ulimaut; tchiklark	ulimaut
Back	tunnuk. tunno	keemiklook (back bone)	tunno	tuno, tunua	kimerlok
Bad	keningarsok, ajor-pok, asseenarmik,		ayorpok ; assilewok ; puuneakput (S)	mamaluuilark, ayorp-tork	
Bark	amerak	amingk (skin)	amek (skin)	amerark	
Bear	nano, nanok	nennook, nannook.	akhlak ; nanook (S) nennok	nannuk	
Beard	ungit	oomitke oomik ;	uminga umik	umrit, umilik	umwit
Belly	nak ; akajarok	neiyuk ; nongik	nek	akudjark	ihgain ; akoak (abdomen.)
Berry		okpict (red) panoong (black) kobluk (yellow)	paungat (pl.)	orpik ; atcidjet paoneret	
Bird	tingivok (flies)	tingmeya ; tigmeak	tingmiak tingmeyak	tinmiark	
Black	kernertok	kerniuk ; muktuk	kerngut ; kernatok	krernertork	kenertork

COMPARATIVE ESKIMO VOCABULARIES—(*Continued*).

ENGLISH.	GREENLAND. (From Egede and Rink).	HUDSON'S BAY. (Gilder and Gallatin).	LABRADOR. (Richardson).	MACKENZIE R. (Petitot).	CHURCHILL R. (Petitot.)
Blood	auk	aoonak ; owg	auk (pl. aggut)	awk	
Blue		toomooktook	tungoiuktak tungayuktak	tugun-yortork	umik-bilik
Boat	kajak ; umiak	oomiak ; kyiak kyak ; oomien	kaiak ; umiavik ;	krayark ; umiarak	kiak ; omiak ;
Body	time (chief point)	kotejeuk	time, kattik	tukroyork(dead b) katirark	nipa (dead b.)
Bone	sorkak (whale bone) kingak (shin bone)	heownick sowner (pl.)	kniapigak (back-bone)	tcaunerk	
Boots	kamik	kumming	kamiksoak	ataunak	kamnick ; ipperautik
Bow	pisigsarpok (shoot with bow)	pitteekee petechee		pititcik	
Boy	meklitok	nukupeairwenee	nukapeak	nukatperark nutarark ;	
Breast	saekik	sokejuck (b. bone)		uyak	atkak
Breeches	karlik	kokahleeng	karlik	kralik	attaktoak
Brother	angejuk ; nuka (eld.) (ygr.)	aninger, nuryearger (sister)	anningna (elder) nukka (younger)	anayoa ; nuka	
Bush	orpik	orpik napakto (tree)	nappartook (trees) okpik (birch)	orpik	
Cheek	ulluk	oolooak	uluak	uluark	
Child	miluktok	mikke ; nooterark	nutarak	nutark, iyaye	
Chin	tablo			takluak, taklu	
Clay	marrak		machak	marak	machak
Cloth		kobloonarktee		kraulok	awpaluktok (red c.)
Coat	manokak (over coat)	artee gee ; kooleetar ;	koalatuk (S)	ulik atige ;	olik ; kalypak

Cold	nigdlertok, keja ; niglek	ikkee	isse ; ikke ; eke (S)	uvalark, keekre nigoelanerk	
Come	tikipok	teekeesharktooktoo	kaiwok (he c.)	tikitoark krayoark	kaiyok
Copper		kanooyak ; kodnooyer	kanuyak	kannoyark	
Crow	tulugak	toolooah	kallugah	tulurark	
Cry (weep)	keja	keeyieyook	kaiumiwok	kriyavoark	kayayok
Cut	kipiva (he cuts it)	peluktook	pillakpok ; kippiwok (he c.)	pilarktoark	
Daughter	panik ; pannia	pannia ; punne	panik	niwidjiark pania	
Day	ullit ;	ogloome	uvlok	krauya ; ublurk,	
Deer (rein)	tukto	tooktoo	tuktu ; tooktoo (S)	tuktu	
Die	toko-wok (dead)	tookoowoke ; takahwuk (dead)	tokkowik (he is dead) toko (S, death)	tokkroyuark	nipa (dead)
Dog	kemek	kimak, kingme krimeg ; mikkee ;	kingmek kemmek	kreymerk	kummek
Drink		emiktook immiekpoke (he)	immek (water)	imerktoark	
Duck	mittiek	meahtuk mittiek	meetuk (S)	ivurark	
Ear	siut	seeatee ; heeutinga	siut	tciun, tciutik	ciun, ciut
Earth	nuna	noona	nuna noonah (S)	nuna	
Eat	nerriok	nereeuktooktoo	nerriwok (he)	nerriyoark	inirriyok (imp.)
Egg	mannik	mannig ; munnik		manik	
Eskimo	kalalek	innueet (pl.)	inuit inhuit (S, pl.)	tchiglerk	aggut

COMPARATIVE ESKIMO VOCABULARIES—(*Continued*).

ENGLISH	GREENLAND. (From Egede and Rink).	HUDSON'S BAY. (Gilder and Gallatin).	LABRADOR. (Richardson).	MACKENZIE R. (Petitot).	CHURCHILL R. (Petitot).
Eye	irse ; irsik	eieega ; eyah (pl.)	isse ; iye ; aiiga	iyik, iyirk	
Eyebrows	kablo ; kagdlo	kobblooshooktoo (to wink)	kabluk (pl)	krablut (pl.)	kimereak kappelut
Face	kinak	keenark keniak	kenak	kinark	
Father	attatak	atata atta ;	attatak	atatak, apan.	ataak
Feather		soolook		tchunark [tchul- uit (pl.)]	
Female	arnak (woman)	neeweaksak		arnenoerark	
Finger	agssait (pl.) tikek ; tirkerit pl.)	argite (pl.) teekeeur ; ikikote (index f.) (lit. f.)	tikkek (fore f.) kerka (middle f.) mikilirak (third f.) erkekok (little f.)	krikertkrork (lt.f.) inurark(pl. inukat)	ekkaikok (lit.f.)
Finger-nails	kukek	kookee		kukek (pl. kukit)	
Fire	ingnek	ikkooma, ikomar	ignik ; ikoma	ignerk	uk'ga
Fish	aulisagak	ekkalloo ; ikkaluk		itkraluk	kakluk, ilook
Flesh	nekke	neerkee		nerkre	nikkey
Foot	isiket ; niuik	issekut	ittigak	itigark	
Forehead	kauk	kowoong kaowga ;	keuk, kauk	karkroa, krawk-tçuark	kawk
Fox	teriangniak	terrearneak	teriennak	terienniak	tareyaneak
Girl	niviarsiarak	nuleuksar-weenee	niwiadziak	arnarenark	uipiakkiak
Go	autdlarpok	attee (imperat.) owdlukpoo	ailerit	aulaork .	
Good	giksok ajungilak	mamakmut ; mamukpoo	ayungitok ; ananuk (S)	mamartook nakoyoark	petcaukuni

Goose		neukaluk	nerlek	tigmerk; uviuverk tattirigark;	timmiak
Grass	iwik ; ivik	eeweek	iwik	ivik	ivik
Great	angivok	angewoke ; annoyoke		angiyork	nguguk angrikuni
Green		toomeooktook		okrork	okok
Hair	nyak	nuyakka ; newyark	nuiak (pl. nutset)	nuyark	mitkok
Hand	arkseit ; agssait akseit, arseilak	iyreteka ; argut ; pukbeeg	aggait	adgirark	aidgeit
Hare	ukalek	ookaeut	ukkalek ; ikkingua	ukalerk	ukalek
He	oma	una ; oma	una ; tamna oma ; tapsoma	oma	uma
Head	kangnak, niakok	neakoke	niakko	neakrork	
Heart	umat	omut ; oomut		oman	
Horns	nagssuk	nugleyou	naksuk	nagiuk	naggiu
Hot	kirsapok, unartok	okko ; oooonah	kivek(heat)onatomik onarsivok (heat)	onarniktoark	uunakum (heat)
House	iglo ; igdlo	igloo	igloo (S), iglo	iglu	iglo
Husband	uived ; uviga (my)	wingah	wi	nulleark	nulleark ; wi
I	uanga	woonga oowungar	uwanga ; oovenir (S me)	uvanga	uwanre
Ice	sikko ; sermek	sikkoo seko	neeluck (S) nilak siko;chikoo(S)sermek	tciko ; tcermerk	ukkiak, ikku
Iron	savik	sowik ; sevwik	kikkiek	tcavi	
Island	kekertak	kigyeucktuck	kik kertak kikituk (S)	krikrertark	
Kettle	iga, uvkusik (pot)	ootkooseek ; ooqueezeek	ukkusik	utkutciki	awiyarak ; immo-eyuak
Kill	tokupa (he k—d him)	tookoopoke (he) tokopahah	tokkowok (he is dead)	torkroniktuark	nipa (dead)
Knee	serkok	nubloote	serko	nablon, niw, tchitkrork	napoelut

COMPARATIVE ESKIMO VOCABULARIES—(*Continued*).

ENGLISH.	GREEN. AND. (From Egede and Rink.)	HUDSON'S BAY. (Gilder and Gallatin).	LABRADOR. (Richardson).	MACKENZIE R. (Petitot).	CHURCHILL R. (Petitot).
Knife	savik ; ullo	panna		tcavik ; ulualuk	anelrot
Lake	tasek	tussig	anniyo ; tessek	tatcirk	kamanek ; taerak
Leg	okpet (thigh) kannak	kuhnok (shin) neyoo ; kannara	nio ; nabgukpa	kranerk ; tchulon	koktoak (thigh) kanaak, nixeo
Lightning	kellek (thunder)	kadloome-ikkooma	kaumarlok	krawmarklork	
Lip	kartlo	koktuweak (upper) kokslu (lower)		kakkiviar (upper) krarklo (lower)	
Living	umavok ; inuvok	innuowoke (he)	innu-wok ; inusek (life)	innuwok, omayoark	
Male	nukagpiak, angut	nukupeak	ussuk	angun ; utcuk	anghut
Man	innuk ; angut (homo) (vir.)	angoot	angut ; innuk ; tukir (S)	innok ; anghon	innuk
Moon	anningat ; kaumei	anninga ; tatkuk ; tukluk	takkek	tatkrark	tatkrak
Morning	ullut (day)	ooblak	kau, kauk ; uvlakut (in the m.)	krakvara	
Mother	ananak	amama	anenak ; akkoa	ananark anana ; amama	annaag
Mountain	kakkak	kingnak, kukkuk kingyi ;	kakkak	errarkr ; kreymirk (hill)	kinnak
Mouth	kannek	kanneera (my) kangyook	kannerk ; kannek	umiloerok	
Neck	igiak (throat)	tokelooga ; koonwesok	kongesek	krunitcirk	
Night	unnuak	oonooak ; oodinnook	unuak	unnuark. unnurk, onuark ; unnuk	
No	nagga	nao ; naka noki ; noker	aukok, naukak ; owkuk (S)	tchuitor ; diunak	naaga

Nose	kingak ; kingera(my)	keinak ; tlingyak kingara (my)	kingah	krenyark, kraymak	
Oil	orssok	okezook (blubber)	ookchuk (S)	orktcok	
Old		ohtokok istootkooah	ittawok	anayuklerk	utokak
Otter			pammioktok	pamiortork	
Pot	uvkusik	ooqueezeek (kettle)	illuterkut	utkutciki (kettle)	
Rain	kerpserluk	makkoopoke (it) mokuktoo	cheilalou (S) sillaluk	nipaluk ; tcillaluk	nipalukuni (v.)
Red	augpalugtok	aoopalook ; owg	aukpallikitak ; aupaluktok	awkpalluktork	awpaluktok
River	kuk	koog ; koo	kok, ku, koggut	kurk	kuuk
Salt		tarreo		natatkron-anoyark tareor (sea.)	tarayok-illerautit
Sand	siorak	seeahwark	siorket (pl.), siorak	tcivorak	
Sea	imak	tarreo; tarreoke	immak	tareor	tareyork
Seal	natsek ; utsuk (fjord s.) (gt. s) kasigiak ; puisse	ookjook ; netchuk, kooshegeer	netsek, puese netchik (S) kassigi-ak oguk, uksuk, oogduke (S)	natcerk ; ugiuk kratcigeark	nadjek natcerk
Shoulder	tue ; tuvik (pl.)	keesik		tuik; keatcik(s.bone)	
Sister	nukartlik (ygr.) allekak ; noya (elder)	neiya ; nuryearger	nayunga (S) neya, neyango (his)	naya, anoyuma (eld.) aka (ygr.)	
Skin	amek	amingk	kesheke (S) amek	amerk	kaypak, amek
Skip	killak	keiluk	killek	kreylark	kaillek
Sleep		seenikpoke (he) sinnikpoo		tchiniktoark	inniktok
Small	kutkiok ; mikkissok	mikkee ; miketookeloo	mikkeh ;	mikiyork	mikikuni
Smoke		eshik	puiok	itcirk	itcirkwark
Snow	anigo ; goviksoak	kanneukpoke (it) appoo	ahpoot (S) kaunek ; aput, annio	apun ; anniyo ; kranerk	

COMPARATIVE ESKIMO VOCABULARIES—(*Continued*).

ENGLISH.	GREENLAND. (From Egede and Rink).	HUDSON'S BAY. (Gilder and Gallatin)	LABRADOR. (Richardson).	MACKENZIE R. (Petitot).	CHURCHILL R. (Petitot).
Son	ernek ; ernerk	earkenearar erninga ; nuterark (child)	ergnek	nutark ; iyaye	iyait (pl.)
Speak		okokpo okakpoke (he)	okarlune	oraktork	uraktok
Spear	anguvigak, kaput nugfit (bird-spear)	-		kapona	
Spoon	aluksant	allute	alupaut	aluktcawn	orwewuyak
Spring (season)	upernak	openra ; oopingyark	oopinukchuk (S)	upinoerark	
Squirrel		shiksik		tikitcorark	
Star		oobloориok oobloobleak	ubluriak	ubloriark	ubloreak
Steal		tigleepoo	tiglikpok (he)	tigiliktoark	tigiliktok
Stone	ujarak	weark ; ooyarra	uyarak ; kaertok (rock)	anmark (flint) uyarak	uyara ; iknek (flint).
Summer	kiek	owyer ; owyak	oopinark (s) auiak	anguyark	alrani (last s.)
Sun	ajut ; sekkinek kaumet	neiya ; sukenuk	naiya ; sekkinek, chukinuk (S)	tchikreynerk	illa-uyak sakkainek
Tent	tupek	tupik	tuppek, toopik (S)	tupperkr	tuppek
They	okkoa	tukoquar (those) tamaquar (these) okkoa	okkoa ; tapkoa tomahny (S these)	okkoa ; tapkoa	
Thou	iblit	ichbin (you) ilweet	igvit	illuit	ilbit
Throat	igiak	tookooedjik		uyak ; igiark	tukku-eyak
Thumb	kublu	koobloo	kublo	kublu	kupoeluk

Thunder	kallek	kadlukpoke (it) kodahlook	kalukpuk (it)	kalluk	
To-day	ullume ; vutsiak	oobloome ; ogloome	ovetseik ; uvlut ooblumie (S)	ublur-krakimna	upelumi
Toe		potowok (big)		inurark pwotorork (big t);	
To-morrow	ullume (to-day)	okkagoo cowpert ; okargo	cowkput (S)	krawpan ; ublum-aypa, arkagu	
Tongue	okak ; ocka	okhara ; ooguark	okak ; okara (my t.)	okrark	ukak
Tooth	kigut, kuitit, (pl.)	keuteetka ; keutee (pl.)	kjutit (pl.)	kigut	kiutit
Warm	kiek	oko	onatomik, kiekpok	uterano	uunakum (heat)
White Man	kablunak	koblunar	kableunak cublunak (S)	krablunark	kuppelunet
Walrus	havik (N. Gd.)	ivick	aiwek	ayverkr	
Water	immek ; imak	emik ; immek	immek emuk (S)	immerk, imark	immek
We	uague	oobahgook, ooagut		uvarut	uwanre (I)
Whale	haphuk (N. Gd.) arbek	okbik	auvek	arverk ;	
White	kakortok	kowdlook, kokuktoo,	kaggortak ; kaggarkpok kaudlukpok ;	kragartork	kakoktok
Wife	nuliak	nooleeanga ; nuleanger	nulia	nullearic	xenenlié (voc.)
Wind	anore	annoway	anoi ; silla ; anorre	anore	annowé
Winter	ukiok : okiok	okeoke ; okeeyook	ookeook (S)	okkeork ; ugiork	ukiok
Wolf	amarok	amaroke ; armow	amarrok	amarorkr	ammarak

COMPARATIVE ESKIMO VOCABULARIES—(*Concluded*).

ENGLISH.	GREENLAND. (From Egede and Rink).	HUDSON'S BAY. (Gilder and Gallatin).	LABRADOR. (Richardson).	MACKENZIE R. (Petitot).	CHURCHILL R. (Petitot).
Woman	arnak ; agna, arngnak	ahdenok arnqua ;	akva ; angai ningi-yok	arne ; arnark	angrenak
Yes	aak	armelar ; ap.	kassak ; aheiila ahilah (S)	ih ; ah.	
Yesterday	vutsiak (to-day)	ikpokeyuk ; ippukshur	ikbukchuk (S)	ikpektciark	ikpakkak
You	illiuse (ye) iblit (thou)	illeepsee ; ichbin	illipse ; igoete (S)	illipci	ilowit
Young	innuoquoak(N Gd) piarak	makkoke ; mikke (child)		nuratchaluk (young man)	innuuk (y. man)
1	atausek	autowzig	atousek	ataotcirk	atauyak
2	arlaek	mudelroc ; moko ;	marruk ; maggok	maloerok ; aypa	malrok
3	pingajuak	pingahsuet	pingasut		
4	sessimat	seetahmut	settamut ; sittamet	tcitamati	itamat
5	tellimat	tedelemut	tedlima ; talima ; tellimat	tallemet, tallimati	tallimat
6	arbouek	okbinuk	arvanget ; pingasuyoktut	arveneloerit	arwilliyit
7	arlaek	okbinuk mokonek	pingasullo sittamello	malloeronik-arveneloerit, arveneloerit-aypak	
8	arbouek pinyusut	okbinuk-mok'-asunik	pinaiuik ; pinganuk	arveneloerit-ilaak	pinnaunik arwinilyit
9	kolliniloost	okbinukseetahmut	tellimella sittamello	krolin-illoat	kulin-uyaktuk
10	kollit	koling	tellima yoktot	kralenotot krolit	kawlit

WESTERN DIALECTS (ALASKA, SIBERIA, AND THE ISLANDS.)

English.	Tchuktchi. (From Klaproth).	Aleutian. (Buschmann).	Kotzebue Sound. (Buschmann).	Kadiak.	Unalaskan.
Arm			tadleek ; attsik		
Arrow		agidak (1) ; ugludax (3)	kakarook, kaweeruk, kookoogwait	chok	ahathak
Axe	kalchapak (1) kalkalima (2)	anigaschik (1) anichssix (2)	ooleemow tchikluk attighimnuk	amgik	
Bear	akliak(1) ; kainga 2)	tangak (1) tangach (2, 3)	tsunack	pagoona, tagookat	tanhak
Beard	uikla (1) tamljutuman (2)	inglak (1) ingljakun (2)	oomich	tamelok	
Belly	aschaegehka (1) akscheka (2)	kilma (1) kilmach (2)	naiyak ; naddjigga ; dirduck	aksechka	sanhoon
Bird		tinglak (1) (eagle) tichljax (2, 3)	tinmearit ; timairik		tehlok (eagle)
Black		kaktschiklulli (1) chachtschach (2)	kangnoak, toringmatik	tannechtuk toonhoohalee	kahchehzeek
Blood	auka (1) auku (2)	aameyak (1) amach (2, 3)	aook ; kaoope	auk	amak
Boat	chajak(1) kajak (2) hanjak(1) agnijak(2		oomeeak ; kaiyak	palayak ; kajak	
Body		ooluk (1), ulljuk (2)	aseet		
Bone		kagna(1) chagnach(2)	oaeeyak		
Boots	kamguk (1)		kummuk		
Bow	tschaikak (1) olebok (2)	saidegaich (2) ssaigich (2, 3)	petik ; petikshia		saeheek
Boy	mikishak (1, child)		einyook	tanogak (child)	
Breast	tchainka (1) tchakygak (2)	ssimsin (1, 2)			
Breeches	kalybak(1) kutlek(2)		kokelek		

WESTERN DIALECTS, ETC.—(*Continued*).

ENGLISH.	TCHUKTCHI. (From Klaproth).	ALEUTIAN. (Buschmann).	KOTZEBUE SOUND. (Buschmann).	KADIAK.	UNALASKAN.
Brother	anechluchtuk (1) kamgojak (2)			anaga	
Cheek		uluha(1), uljngach(2)	oulnat	ooluak	oolloohak
Cold	ninglichtu (1) tschapekunak	kingarialik (1) chinganach (2) kinganaguch (3)	kairunga	njungla	
Crow		kalkagiak (1) chalngach (2) chalchgach (2)		kalnak	kalkahyon
Daughter	pannika (1) panika (2)	asskin (1) aschinuk (2)			
Day	aghinuk (1) gannak (2)	angalik (1) angalich (2, 3)		ignuk ; aganok	anneliak
Deer			tooktoo (r. d.)		
Die	tokok (2)			togodsju (dead)	
Dog		aikuk (1) ssagljack (2, 3)	kenma ; kooneak	piuhta aikuk	ayhok
Drink	emegli (1) magliaga (2)	anogata (1) tanngakuking (2) tangagta (2)	emug ; eemoon	tanha, tanagok	taangata
Duck		tshakutschadok	eewark ; ewuck		schak ; saheedak
Ear	tschiftuchk (1) schiutak (2)	totusak (1) tutussich (2, 3)	taheedik ; sitiki shudek ; chiutik	tshijudok (pl.) tshijun (sing.)	tootoosak
Earth	nuna (1) nunnek (2)	tsohekak (1) tschikich (2) tanach		nuna	chekeke
Eat		kajuhin (1, I eat) chakuching (2) chatga (3)	ashadlooik		kada

Egg		schamlok (1) ssamljax (2)	mannik		samlokamnaholik
Eye	ik (1, 2)	tgak(1), dach (2, 3)	irrik ; erruk	ingalak	
Father	ataka (1), atta (2)	atan (1), adhax(2) adax(3)		ataga, adaga	athak
Finger	aihanka (1) taibano (2)	atchon (1) atchuch (2)	tegheya; tamaridreh; teekera (1st)	swaanga	athoonen
Finger-nails	setunka (1) ischtuk (2)	chagelgun (1) chatalgi (2)	shetooe ; kooguwek kookeoikka	stungga	kahelren
Fire	eknik (1) annak (2)	kignak (1), chignach (2, 3)	ignuk	kuok	keynak
Fish	ikahlik (1) ssaljuk (2)	agalyoghekh ; kakh ;	khalloo ; khalluikht	ikaljuk	
Flesh	kimika (1) naka (2)	ullu (1), ulljuch (2)			
Foot		kita (1), kitach (2)	iddiguy etscheak ;	iuch ; idchuk igugu	keetok
Forehead	kawak (1) kauok (2)	tannik (2) tannich (2)	tannik		tannyak
Fox	iuchka (1) iguk (2)	okotsching (1) ugaging (2) aikaguch (3)	kioktoot ; kaiyok	kabiak	uokcheen
Go		itscha (1) aka	iltiwalluk		icha
Good	matscbinka (1) itainoktok	tshizhelik (1)	mamaypoke necokmuk ;	assiktok	mschheelrek
Goose	eitut (1), lachlach (2)	llak (1), llajin (3) karngangin (3)	tatteereegak, tutteeleega		
Grass	ewuk (1), wik (2)		ebowit	buit	
Great	kaaguk (2)			anguk	
Hair	niyet (1), niyak (2)	emlak (1) imlik (3)	nukhĕt ; nooit	nujet	imleen
Hand		tscha (1) tschach (2, 3)	aishet, argegei	eshet	chianh
Hare	ukairaich (1) ulegech (2)	hamga (1) kamgich (2, 2)			
He	tana (1, 2)	inan (1)		oona	

WESTERN DIALECTS, ETC.—(*Continued*).

ENGLISH.	TCHUKTCHI. (From Klaproth).	ALEUTIAN. (Buschmann).	KOTZEBUE SOUND. (Buschmann).	KADIAK.	UNALASKAN.
Head	naskok (1) naschko (2)	kamgha (1) kamgich (2, 3)	neakoa		kamhek
Horn	tschirunok (1) tscheonok				
Hot				oknochwachtak	
House	ennit (1) mantaak	ooladok (1) ollekh		oolak ; naa	oolon
Husband		ugin (1)	iniak ; quaoog	uika, uiga, ooinga	
I	wi (1), wanga (2)	thin	wonga	chui	
Ice	tchikuta (1) illjelikik (2)	ktak (1) kdach (2, 3)			
Iron		komlegu (1) chumljaguch (2, 3)	chauwik, tshawek,		komljahook
Island		tangik (1) tangich (2)	tudra		
Kettle		aschok (1) assuch (2)	immiruk	asok	aschschko
Knee	tachirkuka (1) tschischkok			tschischkuchka chiskoohka	
Knife	tschebija, tscepiak		sequetat	kamelak	
Leg			kannuk ; kanaiac		
Lip		kotschun (1) adich (2)		hlukha	athek
Male	jugut, igauk (2)				
Man	uika (1), juk (2) (male)	taioch (1) taijaguch (2)	tuak	schuk	tayaho (homo)
Moon	irallik (1), tankik (2)	tugidak (1) tugidak (2) tugidach (3)	tadkuk	yaalock ; toogehda igaluk	tooheedah

7

Morning		kilak (1), chiljack (2)			keelyan
Mother		anaan (1), anach (2)		anaga ; anaha	annak
Mountain	ingrit (1), naigak (2)	gaiuk (1), chajach (2)	mugwee	poonhokanlie ingiah (volcano)	koothook
Mouth		agilga (1), agilgich(2)	kainneeak	kanok	aheelrek
Neck	igliak (1, throat) iaah (2)	uly (1)	koomootsia	ooyagut	oouk
Night	unimkukoni (1) unnjuk (2)	amgik (1), amach (2, 3)		unuk, unjak	amak
No		kugu (2) kugo, ko	nao ; nago ; ena		
Nose	chingak (1), ʻatik (2)	angossin (1) angussich (1) angussin (3)	kingak, kingnuk	kinaga	anhozen
Rain	imagnachta ; neptschuk	tshiotakik (1) tseichtach (2) tsichtach (3)		kedoh ; kedok	chehtak
Red	kawachtuk (1) kakluk (2)	olutuk (1) uljudach (2)		kawychly	oolluthak
River	kuigutt (1), kiuk (2)		kuak, koouk	kuik	
Sand	kanjak(1), kannik(2)	tschooguk (1) tschuguch (2)		kabea	choohook
Sea	imah (1), mok (2)	alaguk (1) aljajug (2) allguch (3)		alaook, imtschk	allaook
Sister	najahak (1) najaka (2)	angeen (1) unguch (2)			oonheen
Skin	amik (1), nakha (2)	katschka (1) chatschuch (2)			
Sky	keilak (1), kiilah (2)	inkak (1) inich (2, 3)		keleik	innyak
Snow	anighu(1), annu (2)	kanek (1) chanich (2, 3)		annue, annju	kanneeh
Son	rinaka (1), jegnika(2)	alaan (1) ljljach (2, 3)		ningoaga (son-in-law)	

WESTERN DIALECTS, ETC.—(*Continued*).

ENGLISH.	TCHUKTCHI. (From Klaproth).	ALEUTIAN. (Buschmann).	KOTZEBUE SOUND. (Buschmann).	KADIAK.	UNALASKAN.
Spring (season)	anchtoha (1) pochlachta (2)				
Star	iralikatach (1) igaljitak (2)	sstok (1) sthach (2) sthan (3)	obloaret	tschinguluk madzak	stan
Stone	uigum (1), uigach (2)			yamak	
Summer	kegmi (1), kuiga (2)			kiek	
Sun	matschak (1) tschekenak (2)	akatak (1) agadach (2, 3)	maje ; neiya	agadak	ahhapak
Thief	tingillingachta (1) tuillugg (2)			tugljunagali	
Thunder	katluchta (1) neptschug (2)	shulukshik (1) ssuljuch (2, 3)			
Tongue	ulliu (1), ullju (2)	agnak (1) agnach (2)	uwa ; ukevaa	uljui ; agonok	ahnak
Tooth	wuttinka (1) gutik (2)	ahalun (1) kigussich (2) kigussin (3)	kutei ; kootay	chudyt ; hoodeit	keahoozen
Water	emak (1), mok (2)		imik	tangak ; mooe	tanak
Weep	kia (1), konynge (2)			keyya ; keja	
Whale	agobok, abuk (2)			agbok	
White	kachschuchtuk (1) katilge (2)	komakuk	kowlook (cloth)	katachtok katogalee	
Wife		aayagan (1) ajagach (2, 3)			
Wind		matguk (1) miduch (2)	anoagway	kyaeek	kycheek
Winter	ukjumi (1) ukschok (2)			ukshiok	
Wolf	keilunak(1) amma (2)		amaok		

Woman			oolea	aganak	
Wood	unachtschik (1) unadschek (2) kuchtumak (2)		oomakselak, keiyu	kabohak, (trees) tsabaluka	
Yes	i (1), ai (2)	aang (1), ang (2)	a, eh	aang	
You	aultetschi (1) ellpetschi (2)	tchitche		itlpit ; alpit	
Young	atschik (1) lukalpijuk (2)				
1	attachlek (1) ataschek (2)	attakon (1) atachan (2) attachan (3)	adaitsuk	attauden	atoken
2	malguch (1) malgok (2)	alluk (1) alach (2, 3)	eepak	aslchaj	arlok
3	pingaju (1) pigajut (2)	kankun (1, 3) chankun (2)	pingeyuk	pingaswak	kankoo
4	istima (1) ischtamat (2)	schitschin (1) ssitschin ssatschin (3)	tsetumet	stamik	seecheen
5	tachlima tatlimat	tschang (1, 2, 3)	taleema	talimik	chaan
6	atashimagligin sewinlak (2)	atun (1) atung (2, 3)	aghwinnak	aghoiljujun	atoon
7	malgukawal (1) malguk	olung (1) ulung (2) uljljung (3)	aghwinnipagha		ooloon
8	pingaju (1) pigajuk (2)	kamtsching (1, 2, 3)	penniyooik	malchonghin	kancheen
9	stammo (1) agbinlik (2)	ssitsching (1, 2) ssiging (3)	seetuma	kulnghuen	seecheen
10	kulle (1) kullia (2)	gasuk (1) atuk (2) atich, assak (3)	tadleema	kulen	atek

TSCHUAKAK I.

(From Buschmann).

English.	Tschuakak	English.	Tschuakak.
Arm	aihanka (hands)	Nose	kanka
Axe	kajugun	Rain	niptschuku
Bird	kawak	River	kijuk
Black	molikchtal	Sand	tschirgat
Clouds	makssliuk	Sea	imak
Day	aganik	Stars	ialktagit
Earth	nuna	Stone	knakjak
Eye	tschichka	Sun	tschekinuk
Father	atanna	Tooth	kehutani
Foot	itiganka	Tongue	uliupa
Fox	kawijaka	Water	mok
Hands	aihanka	Whale	inutuk
Heaven	tschlia	White	kchtschuktak
Ice	tshikuk	Wife	mulechka
Iron	tschawigak	Woman	agnak
Island	kichkagat	One	atawtschigak
Lake	naiwagach	Two	mamosik
Man	juk	Three	piengaju
Moon	takik	Four	staman
Mother	nang-a	Five	tassliman
Mountain	najagat	Ten	ullia
Mouth	kanka	Twenty	juwinak
Night.	upuk		

WINTER ISLAND.

(From Buschmann and Lyon).

English.	Winter Island.	English.	Winter Island.
Arrow	kakliok	Mother	ánana
Bad	mamaitpok	Mountain	kingnak
Beard	umikh	Mouth	kannira
Boat	kayak	Night	unnuk
Dog	kaimeg	Nose	king-ar
Ear	hiutiga	Reindeer	tooktoo
Eatables	nerioka	River	ku
Eclipse	shiekenektoonilikpa	Spirit	innua
Eye	ai-iga	Sun	naiya
Father	attata	Tattoo	kakkeen
Fire	ikkoma	Tooth	kiutitka
Food	tamooa	Water	immek
Foot	ittikatka	Whale	hiokkak
Give me	pilletay	White man	kabloona
Gnat	nulikak	Wolf	amarok
Great coat	kooillitleuk	Wife	nuliya
Hand	iyutka	Wolverine	kablie
Hood	amauta	Woman's boat	oomiak
Husband	uinga	One	atawsek
Ice	sikku	Two	ardlek
Iceberg	peekalooyung	Ten	irkitkok
Knee	setkoa		

STUART ISLAND AND NUNIWOK.

(From Buschmann).

ENGLISH.	STUART ISLAND.	NUNIWOK.	ENGLISH.	STUART ISLAND.	NUNIWOK.
Arrow	kchut	kchuput	Mouth	kipich	kapka
Bear	tagukak	cewut-aguka	Nose	knak	knaka
Beard	ugat	talomok	Otter	pamoktat	pamoktat
Bird	tchimiat	tuniammiak	Rain	iwishuk	iwujuk
Black	tangik	tschumichschitok	Tooth	kehutit	kehutet
			Tongue	uliu	uliuka
Dog	kimuchtat	keimuchta	Water	mik	mok
Ear	tschiutit	tschuat	Whale	agiwgit	agobok
Eye	ik	igikka	White	ikuk	katagali
Father	adaka	atakka	Wolf	kiklungit	kagopik
Fire	knik	kinik	Wife	nulialiaka	nuleaka
Fish	ikaliuchpit	talechnika	Woman	agnak	agnok
Foot	igut	itugomka	One	atawtschik	atawtschik
Fox	kawssiak	kasijagat	Two	aipa	aipa
Gnat	mliugshok	mliumigit	Three	pingachwa	pingaju
Hair	nujat	nucht	Four	tschtami	tschtamik
Hand	talik	aichanka	Five	talimi	tasslimik
Husband	nugalpiak	nugaspiak	Six	agwingu	agwingog
Iron	tschauik	muisslch gak	Ten	kulguchtok	kulin
Knee	tschaschkut	tschaschkok	Twenty	juinak	tschuinak
Mother	anaka	annaka			

ALASKAN DIALECTS.

(From Dall).

English.	Ugalakmute.	Chugachigmute.	Nushergagmute.	Kuskwogmute.	Ekogmute.	Unaligmute.
Bad				knuignagkuk	asseetuk	aseetuk
Big	antoadouk	anishkak	antoak	chakliuk	onguk	onguk
Boy				tangialavok	tanigowiluk	
Chief					ongiuk	ongiuk
Cold	uglia	apachtok	nuglia	packnak	ningluktuk	kwitanak
Fire	knik	knik	k'nik	'knik	kanuk	'knuk
Fish	tchadok	t'katlink	nunka	ikalouk	nukut	kotlewit
Girl				nozeachuk		puneeguh
Good					asukhtuk	askihtok
He	oum	oum	tkna	taouna		una
Hot	magakhtok	magakhtok		kikhchatak		kootzunguk
I	roingnia	kooi	hwignia	hwihka	hwih	wunga
Ice		tchaguk		chiko	cheekook	seko
Island			kightak		tikestuk	kegiktukh
Knife	noshek	nowguchak	ulirak	chivichuk	chiwik	chiwik
Land	nunna	nouna	nouna	nouna	nunuh	nunneh
Little		mikangoshak		ontouchpak	meekuk	mikuk
Man	akwin	nugulpeuk	agiun	yugut	yuk	yut
No					peetuk	peetuk
Rain	schliachlook	kitichtouk	chliachlouk	chiakluk	ibizhukhtuk	igesikhtuk
Reindeer		kana-et		tuntu	toontook	toontook
Snow	kanichtchak	katagak	kanikchak	kanikshak	unyuk	slachliktuk
Water	mik	mik	'mik	mik	muk	muk
Wife				nuliga	nulikhuh	nuliayka
Woman	agnak	aganak	agnak	agnak	okhanak	oghanut
Yes					hwokah	wah
You	'lbitt	'tlpit	'lbit	'lpit	ikhluit	ikh'lepit
1	ataouchik	atchimouk	ataouchik	atauchik	atowchuk	atowsik
2	aipa	malgook	aipa	malkhok	mahbrukh	malanik

3	pinadook	pinnagon	pinanoak	painaivak	pingien	pingaiuk
4	schtamik	schtaman	s'chamit	t'chamik	t'stamen	s'estamat
5	talimik	talimin	talimit	talimik	telemut	telemat
6	aghvinik	akioiljin	awiunat	akhvinok	agwinulit	ichuksut
7	2 repeated	malchoulin	2 repeated	acnakhvanam	maloodinulit	malooksipnuleet
8	3 "	immolgin	3 "	pinaiviakh	pinganulit	pinaiuksipnuleet
9	4 "	koulmoyian	4 "	chtamiakvanam	koolinolit	koolinotylit
10	5 "	koulin	koulin	kullnuk	koolinak	kolin

ALASKA, ETC., DIALECTS.

(Dall).

ENGLISH.	UNALASKAN.	ATKAN.	KONIAGMUTE.	MAHLEMUTE.	CHUKLUKMUTE.	SCHUGAZZ.
Bad	macheedolikan	malcheeshelikan	aseelrok	ashuruk		assitok
Big	anianach	tangoellik	ang'uk	ongyruk		angitschkoktschok
Boy	anektok	anekthok	tanoghak		mogiloerak	
Chief	tajaghu	toigon		omaylik		
Cold	kinanach	kinganalik	potznatok	allapah		
Fire	nignach	kignach	knok	iknik	klugg	knakch ; kinokh
Fish	kach	koach	ekachleut	ikothlewik		egachluk
Girl	achadok	ogegilikin	aggeakeak	puneeguh	annaechae	achajack
Good	macheeselik	chizchelik	aziktoak	nakuruk		assichtok
He	inan	ikoon	oona	una	enkan	
Hot	akivakselik	akoachelik	nogtoak	kooshunguk		magachtok
I	tirm	keen	chooi	wunga	goone	chui
Ice	kelach	k'thak	tahigo	seko	chiggo	tschikok
Island	chananak	taangik	kightak	kikhtuk	kechet	kikechtonak
Knife	kamlech	ungazchisip	tkchangielk	chowik	chawik	
Land	tchikitch	chegak	noono	nunneh	nunna	nuna
Little	angnunadalak	angonolokn	meyuk	mikiduruk		mikuengroschak
Man	taiggaich	toioch	nukalnyak	enyuk	yuk	schuk

ALASKA, ETC., DIALECTS—(*Continued*).

(*Dall*).

ENGLISH.	UNALASKAN.	ATKAN.	KONIAGMUTE.	MAHLEMUTE.	CHUKLUKMUTE.	SCHUGAZZ.
No	kogcho	maselikan	pedlok	peechuk	al'eah	
Rain	chichtach	chiutakik	kidak	seeuluktuk	nepchug	kaitak
Reindeer	ithayok	itkayech	toondoo	toontook	koinaik	
Snow	kanich	kaneek	anneg	uphun	kaing	anniu
Water	tanach	taangak	tangak	immik	muk	mmak
Wife	agegai	aiyagai	nuliya	nuleeka	nulikert	nullijaka
Woman	angaginak	aiyager	aganok	okanok	anak	aganak
Yes	ang	aang	ang	wah	ee	
You	thinn	ingaan	ch'lpit	illewit	goot	
1	atakan	attokan	acheluk	atowsik	atchig	atlitschik
2	alach	alluk	malogh	malruk	maelruk	atlcha
3	kankjannoon	kankoon	pingaien	pinyusoot	pinaiig	pingaiyna
4	sitchin	shitchin	stamen	setemat	stamoch	tschitaami
5	tchann	chang	taliman	talemat	talimaet	tallimi
6	atyoon	attoon	agowinligin	aghwinuleet	arringt	achoinligu
7	talann	olung	malchongun	mahlooditaghwinuleet	mararvingt	malchomin
8	kanitchin	kamtsching	inglugin	pinyusoonilaghwinuleet	pingaivingt	ingeljulin
9	sitchinin	sitching	kollengaen	koolinotyluk	stamiluellig	kolungojan
10	atik	nasuk	kollen	kooleet	koela	koln

HUDSON'S STRAITS AND CUMBERLAND SOUND.

(From Hall).

ENGLISH.	ESKIMO.	ENGLISH.	ESKIMO.	ENGLISH.	ESKIMO.
Arm	teloo	Fire	ikkumer	Skin	kow (walrus hide)
Axe	oodloo	Flesh	krang (whale's)	Sky	selar
Bad	peongetoo	Foot	issikar (pl.)	Small	mieookooloo
Bear	artukta(yg) ninoo(wh b) puongnung (blk. b.)	Give	piletay	Sorcerer	angeko
Berry	kiotungnuna (blue berries	Good	peeuke	Spear	oonar (seal s.)
Bird	sikyarung (b. like robin)	House	igloo	Sun	sukeneir
Black	kernuk	Husband	winga	Tent	tupic
Blood	oug	Ice	seko	Tide (ebb)	tinne
Boat	kia ; oomien	Iron	sowik	Wait	wichou
Boots	kuming	Island	kikituk	What is this?	kissu
Breeches	kodling	Kettle	ookoosin	Where	noutima
Child	nutarung	Knife	oodloo	Whale	ogbig
Cold	ikke	Lamp	koodlin	White (man)	kodluna
Come	kiete (c. in)	Louse	koomuk	Wind	wongnuk (north w.)
Deer	tuktoo	Man	innu	Woman	nuliana (wife)
Die	tukawoke (it is dead)	Me	wonga	Yes	armelarng noodloo
Dog	kingok	Mitten	pauloo	1	attousen
Duck	meituk	Much	amasiut	2	mukko
Earth	nuna	No	name ; argi	3	pingrsiut
Eskimo	innuit	Opening in ice	oukunnier	4	tessamen
Fat	ooksook (blb.) toodnoo (tall.)	Red	oug	5	tedlamen
Father	atata	River	koong	6	okbinerpoon
Finger	teekee	Salmon	ekerlooung (small) ekerloo(la.)	7	mokkinik
		Sea	tarrio	8	pingasunik
		Seal	ookgook (lg) kussegear	9	tessamenik
				10	koodlin

NORTH GREENLAND.

(From Ross).

(Humoke two Dialects N. and S.)

ENGLISH.	NORTH DIALECT.	SOUTH DIALECT.
Awk	akpalliarsuk	akpulliorsh- usweet
Daughter	panni	pani
Dog	kimuk	kimuk
Eyes	pisiok	pisiok
Fire	innik	innik
Go away	naakrie-aiplaite	naakrie-aiplaite
Harpoon	tookuk	olooktuk
Hood	ilpaousuk	okoukak
Hooks (for lamp)	kelipsuet	ousiut
Ice	licou	licou
Iron	sowik	sowik
Knife	bellaouduk	sowik
Loon	akput	pyealhussweet
Meat (boil.)	olelie	osotoelu
Moon	anningaak kaimut	anningaak ; pinga
Mouth	kauneek	kanneek
No	naakrie	naakrie
Nose	kinjak	kinjak
Sea-horse	havick	havick
Seal	pussi	pussi
Shaft (harpoon)	ermeinuk	ipporu
Shirt (duck skin)	pinuset	ater
Skin	haminuk	haminuk
Sledge	kamoutik	kemoutipalaiut
Son	enra	enra
Stone	okekesuk (blk.lamp)	ouyorak
Sun	succanuk	succanuk
Traces (for dog)	peliulet	usintel
Water (fr.)	hemuck	hemuck
Water (sea)	heniok	heniok
Whale	hapbuk	haphuk
Woman	arnet	arnewerset
Young (man)	innusholok	innuquowak

Numerals the same in both dialects :—One, allausit ; two, ailek ; three, pinguijuk ; four, sissimat ; five, tallemat.

COMPARATIVE ESKIMO AND INDIAN VOCABULARIES.

I.—Eskimo and Tribes of British Columbia.

(Indian from Tolmie and Dawson).

ENGLISH.	ESKIMO.	INDIAN.
Arm	tellek (Gd.), tailek (Ch. R) tallek (Kotz.Sd.), talek (Malem)	talloo (Kawitshin) uhthleik (Thlinkit, hand)
Bear	tanhak (Unal.), tangak (Ala.)	tahn (Haida), nanne (Aht)
Beard	oomik (Huds. St.), umuit (M.R.) oomich (Kotz. Sd.)	imuh (Tshimsian)
Body	aseet (Kotz. Sd.)	oosit (Aht)
Bone	tcaunerk (M.R.), heownik (H. B.)	stzaum (Kaw), hummot (Aht)
Ear	tschuat (Stuart I.), tcium (M.R.) hiutiga (Wint.I.) shudek (K.Sd.)	tahksta (Bilk) geu, keu (Haida)
Father	apan (M. R.), abaga (Kad., gd. f.)	abo (Tshims)
Finger-nails	kukek (Gd.), koogwek (K. Sd.) stunga (Kad.), chaelegun (Al.)	kahaku (Thlinkit) slakunge (fingers)
Fire	keynak (Un.), ukga (Ch. R.) kinik (Nuniwok), innik (N.Gd.)	kan (Thl), haiuk (Kawitsh) inik (Aht)
Fish	khalliukht (K.Sd.), khalloo (K.Sd.)	klo, kluk (Tinné)
Forehead	kauok (Tschuk.), kawk (C. R.) kauk (Gd.), kawak (Tchuk)	kakook (Thl)
Heart	umat (Gd.) omut (H B.) oman (M. R)	ihumuh (Aht)
House	ooladok (A.) oolak (K.) oolon (Una.)	allal, allun (Kawitsh)
Ice	ktak (Al.), tciko (M.R.) chikoo (Lab.), tchikuta (Sch.)	tihk (Thl)

COMPARATIVE ESKIMO, ETC.—(*Continued*).

ENGLISH.	ESKIMO.	INDIAN.
Knife	sauik (Gd.), chowik (Mal.) sowik(H. B.),chauwik(KSd, Ir.)	skow (Haida)
Land	nuna (Gd, H. B, Mal, Kad, M. R.)	nammao (Aht)
Man	innuk (Gd, C. R.), innok (M. R.) juk (Tch.), ooinga (Kad. husb.)	wins (Sahapt) youh (Thims), enika (Kaw)
Night	uata(M. R, eve'g), oodlinook(Cu. Sd)	uthai (Aht)
Sun	sukkenuk (H. B), sikenyuk (Mal)	snukum (Selish)
Teeth	kigut (Gd, M. R), kiuteet (C. R) kigussich (Al), gutyk (Sch)	kik (Kwakiol) gigeis (Kaw), utit (Sahapt)
Water	kuak (K. Sd, river), kuk (Gd) kuuk(C R), koo(H. B), koke(Mal)	tsuuk (Aht), ko (Niskwali)
Woman	achanut (Mal), aganak (Kad) ajagach (Al), aganach (Sch)	akugeluk (Tshinook)
One	attowseak (H. B), attausek (Gd)	tsowak (Aht)
Two	ailek (N. Gd), ardlek (H. B)	utluh (Aht)
Ten	koela (Chukl), kulle (Tch) kulen (Kad), kullnuk (Kusk)	klal (Haida)

II.—Eskimo and Wailatpu-Molele, etc.

(Indian from Hale).

ENGLISH.	ESKIMO.	INDIAN.
Arm	tellek (Gd), tailek (C. R) talerk (M. R), tallek (K. Sd)	teilag (Wail)
Arrow	kakliok (Wint. I), agdligah(Gd) chok (Kad), chook (Tch)	watchl (Mol)
Beard	tamelok (Kad) tamljutuman (Tch)	temeks (W) tememeokscho (W)
Bird	tinmiark (M. R), tingmeya (H. B)	tianiyiwa (Cayuse)
Bone	oaeeyak (K. Sd)	iaotso (Tchin)
Daughter	panik (Tc), panik(G), punne(CSd)	puena, pena (Mol)
"	ashkin (Al) asskin (Al)	okchan (Wail) asa, ahkan
Dog	piuhta (Kad)	kiuhtan (Tchinook)
"	eamukta (Mal), kemek (Gd) kummek (C. R), iukuk (Al)	camuch (Tchin) witkui (Mol)
Earth	analq (Al)	ano (W)
Eye	iik (Tch) iyik (M. R), eigeea (H. B)	eagot, hakamush (Cayuse)
Father	ataak(C. R), atta (H. B), attata (Gd)	totscha (W)
Fire	annak (Tch)	hamai (Willamet)
Forehead	kauok (Tch), kaowga (H. B)	okegwo (M)
Friend	ilipolee (K. Sd)	elapoint (W)
Go	iltiwalluk (Kotz. Sd) aulaork (M. R), attee (H. B)	whuleok, kuli(Tchin) tatten
Grass	wik (Tch), iwik (Gd)	qoischt
Great	paluk (M. R. termin.)	pol, pul (Willamet)
Green	okok (Gd, K. Sd)	yotzyotz
Heart	oman (M. R)	quamonitchl
House	ooladok(Al), oolak(Ka), oolon(Un)	helim (Molele), alutkh (Skwale)
Husband	iniak (K. Sd) quaoog (K. Sd)	inaim (W) qwap (M)
Ice	tciko (M. R), ktak (Al)	tok (W)
Iron	chawik (K. Sd)	keweoke (Watlalu)

ESKIMO AND WAILATPU-MOLELE, ETC.—(*Continued*).

ENGLISH.	ESKIMO.	INDIAN.
Knife	sequetat (K.Sd), chowik (Mal) tcavik (M.R)	schekt (Cayuse) gaweke (Watl)
Lightning	katluchta(Tc), schulukshik(Al) kallek (gd. thunder)	ekolikst tschultoa
Man	innuk (Gd), innak (M.R) angut (Gd), anghut (C.R)	anwoeke
Mother	aunaag (C.R), anaha (Kad) anaan (Al), anana (M.R)	aan (Ruslen)
Mountain	ingrit (Tchuk), kinguak (H.B)	yongint
Nails	stunga (Kad) setunka (Tch)	schingish (Skil) suks
Snow	kooguik (K.Sd), annigo (Gd) annue (Kad), annighu (Tch)	annoopak (W)
Star	sthak (Al)	kaki (Walla Walla)
Sun	akathak (Al), ahhapak (Un) agakak (Kad)	akatchach (Watl)
White	kachtschuchtuk (Tch) katagalee (Kad)	tchlaktchlako (Tshailish) tchlaksch (Mol)
One	atoken (Un), atachan (Al)	eght, echt (Tchin)
Head	kamnek (Un), kamgha (Ala) komak (M.R)	khumukum(Piskaw) khomut (Kowelitsh)
Mouth	kauuk (Mal) kanok (Kad)	kamukh (Skwale) kunikh (Kowelitsh)
Teeth	wutlinka (Tch), hoodeit (Kad)	yeutnes (Tsihailish)
Mother	illak (M.R, parents)	ulua (Nsidshaws)
Father	illak (M.R, parents)	ulua (Nsidshaws)
House	oolak (Kad), ooladok (Al)	alutkhl (Skwale)
Foot	talik (Stuart Island, hand)	tailuks (Molele)
Son	iyait (C.R. pl), iyaye (M.R, child)	waiu (Mole'e)

III.—Eskimo and Comanche.

ENGLISH.	ESKIMO.	COMANCHE.
Bear	aoutkliut (Mal), akvik (M.R)	ochzo
Body	aseet (K.Sd)	wakhchee
Bone	tcaunerk (M.R), tcheonok (Tch)	tsouip
Boy	einyook (K.Sd)	too-anikpee
Breast	tschakyiak (Tch)	toko
Child	iyaye (M.R)	too-achee
Earth	tshekak (Al), chekeke (Un)	chokoo
Evening	amak(Un), amach(Al), unnuk(M R	jehume
Feet	igugu (Kad)	koegen
Forehead	kawk (C.R), kauk (Gd)	kai
Hatchet	tukinayork (M.R)	tohihowan
He	oona (Mal), oona (Kad), inan (Al)	ennes
I	wounga (Mal), wonga (K.Sd)	un
Knife	tcavi (M.R)	habi
Night	tak-poke (M.R, it is dark) taark (M.R)	tookana
No	naaga (C.R), nago (K.Sd)	neatz
Tent	itcark (M.R)	tozak
Throat	tokelooga (H.B, neck) tukku-eyak (C.R)	toichk (neck)
Tongue	ukak (C.R), okak, oka (Gd)	ekh
Warm	uterana (M.R)	uruik
Yes	a, eh (K.Sd), waa (Mal), ah (M.R)	ha

IV.—Eskimo and Dakota-Hidatsa (Siouan).

(Siouan from Hale).

ENGLISH.	ESKIMO.	SIOUAN.
Alive	inuvok (Gd), innuowoke (H.B) innuwok (M.R)	inima (Tutelo) eni, ini (T)
All	orkrot (M.R)	okahok (T)
Arm	aishet (K.Sd) eshet (Kad, hand)	histo (T) isto (Dakota)
Ashes	olayoyork (M.R, dust)	alapok (T)
Aunt	aya, atca (M.R)	icami, ika (Hidatsa)
Axe	ungachizip (Al)	hisepi (T)
Bad	ashuruk (Mal) kuyork (M.R)	icia (H) ukayek (T)
Bird	ekashika (Mal)	tsakaka (H)
Bird's nest	tch.te (M.R)	ikica (H)
Bite	chagta (Ala, eat), akwaron (M.R)	yaksa (D)
Blood	itchui-tuark (M.R, bloody)	idi (H)
Blue	tugun-yortork (M.R)	tohi (D)
Boil	gaɣe (Tch)	hieha (T)
Bone	oaeeyak (K.Sd)	wahue (T)
Boy	kakooshka (Mal)	kocka (D)
But	ami (M.R)	mi (T)
Cheek	ulujugach (Al)	iyoqa (D)
Chop (v.)	kiktertourk(MR), chaggidzu(Kad)	kaksa (D)
Claw	chagelgun(Al), kookikka(K.Sd) shetohe (K.Sd)	tsake (D) tsakaka (H)
Come	uvunaren (M.R)	hawa (T), uwa (D)
Cry	kia (Tch), kayayok (C.R) keyya (Kad), keja (Gd)	tcyea (D)
Dead	toko (Gd, S.B, death) tokok (Tch), tukro (M.R)	teka (T)
Duck	mittiek (H.B) meetuk (S.B)	skiska migata (H) maghak sitca (D)
Eat	chagta (Al)	yuta (D)
Evening	uata (M.R)	qayetu (D)
Eye	irsich (Gd), shik (H.B), iye (Lab)	ista (D, H)
Father	atta (H.B, Tch) ada (Al), attata (Gd)	ate (H, D) eta, tat, yat (T)
Finger	ekkaikok (C.R, little finger) ekikoke (K.Sd), tikkiek (H.B)	hak (T)
F. nails	shetooe (K.Sd), chagelgun (Al)	tsutsaka (T), cakicpu (H)
" "	kookee (H.B), koogwek (K.Sd)	cake (D)
Foot	isiket (Gd), ithkeik (H.S)	isi (T), siha (D)
"	eshet(Kad, hand), etscheak(K.Sd)	itsi (H)
Fox	uokcheen (Unal) uikaguk (Al), iuchka (Tch)	iqoka (H)
Girl	mikishak (Tch, child)	miakeja (H)
Grandfather	atatark (M.R)	adutaka (H)
Green	okok (C.R, K.Sd)	oto (T)
Hand	tsha, tshach (Al) akseit (Gd), atchuch (Al. finger)	haki (T), saki (H)
He	uma (C.R), oma (H.B, M.R)	im (T)
Heart	kanog (Kad), kanug (Al)	yanti (T), tcanti (D)
House	itcark (M.R), tupek (Gd, tent) tuppek (C.R), topek (Mal)	tipi (D), ati (T,H)
Ice	taiko(M.R), siko(Gd), seko(Mal) sikkoo (H.R)	tcaga (D)

ESKIMO AND DAKOTA-HIDATSA, ETC.—(*Continued*).

ENGLISH.	ESKIMO.	SIOUAN.
Kettle	asok (Kad), aschok (Al)	yesink
Kill	toko (Gd, death)	kte (J, D)
Leg	etscheak (K.Sd, foot) iucha (Tch, foot), nicheo (C.R)	yeksa (T)
Man	juk (Tch), jugut (Tch)	yuhkan (D)
Mother	anana(MR)annag(CR)anaha(K) annak (Un), anam (Al)	ina, henun (T) ina (D)
Neck	takku-eyak (C.R, throat) tokelooga (H.B)	tahu (D)
Night	unjak(Kad)amgik (Al)unjuk(Tch)	hangyetu (D)
Old	arkro (M.R)	hohka (T)
Sew	kakkiok (Gd), kakio (Tch)	kagheghe (D)
Sister	oonheen (Un), anoyuma (M.R)	inu (H)
Sit	inik-toark (M.R)	amaki (H)
Small	tchikore-ituark (M.R)	tcikadan (D)
Speak	urak-tok (C.R), oeaktok (Mal) okak-poke (H.B)	aaklaka (T)
Walk	attee (H.B, go)	yatura (T)
Warm	okko (H.B), uterana (M.R)	akahą (T), ade (H)
Yes	a,eh(K.Sd), ioaa(Mal),ih,ah(M.R)	e (H), aha (T)
Fire	ikuma (H.B) ukga (C.R, fire)	auaqa (H, burn) aghu [D, burn]

V.—Eskimo and Cherokee-Choctaw.

ENGLISH.	ESKIMO.	INDIAN.
Axe	kalkalima [Tch], kalchapak [Tch]	gahlungahste [Cher]
Bad	ayortork [M.R], ajorpok [Gd]	ooyohee [Cher]
Black	kangnoak [K.Sd]	kungnaligh [Cher]
Blood	amak [Un], aamyak [Al]	homma [Choc]
Bone	he ·wnik [H.B], tcaunerk]M.R]	foni [Choc]
Ear	tschiftuk [Tch]	istehuchtsko [Choc]
Fish	ikkalloo [H.B], khalloo [K.Sd]	kullo [Cher], agaula [Choc]
Hail	kannik [H.B, Tch]	gahnasookha [Choc]
Hair	naitcak [M.R], nuyakka [H.B]	nutakshish [Choc, beard]
Head	naschko [Tch]	naskubo [Choc]
Heart	oman [M.R], omat [Tch]	oonchee [Cher]
Heaven	keliok [Kad], kulak [Tch] keilyak [K.Sd]	gullungluddee [Cher]
Hot	okko [H.B], uchnachtok [Tch]	ukanawung [Cher]
Night	unjuk [Tch]	ninnok [Choc], nennak [Musk]
River	kiugutt [Tch], kuk [Gd]	hucha [Choc]
Summer	kiuga [Tch], kiek [Gd]	kohkee [Cher]
Throat	igliak [Tch]	ahgelega [Cher]
Thunder	kalluk]M.R], kallek [Gd]	hiloha [Choc]
To-morrow	unak [Tch], annoaga [Kak]	onaha [Choc] ,
Water	imek [Gd], eemik [K.Sd] immek [H.B]	ahma [Cher]
Woman	achanut[Mal] aganak[Tch.Kad] ajagach [Al]	ageyung [Cher]

COMPARATIVE VOCABULARY.

Eskimo-Turanian.

English.	North Asiatic.	Eskimo.
Abandon (v)	hagi-ni [Magyar, Mag]	igi-toark [Tchiglit, Mackenzie River, M.R]
Arm	täl [Vogul, Vog]	tailek [Churchill River, C.R] teloo [C.Sd]
"	tel [Ostiak, O]	tallek [Kotzebue Sound, K.Sd] talerk [M.R], attsik [K.Sd]
"	utte [Sam]	talek [Malemute, Mal] talik [Stuart Island, S.I]
Arrow	johota [Samoied, Sam] ok [Turk, T], ok [Jakut, Jak]	chok]Kadiak, Kad], chook [Tchuktchi, Tch], ikkuk [Kuskut], kukki-krark [M. R], kchut [S.I] kok-yoke [Cum. Sound, C.Sd] kakarook [K.Sd]
Ashes	hai [Japanese, Jap]	aria [M.R], agak [Lab]
Aunt	haja [Kott, K]	aja [M.R], aianga [Lab]
Autumn	aki [Jap]	ooke-ark [Stupart's Bay, S.B] ookeuk-shark [C.Sd]
"	chuk [Aino, A]	okiok (Greenland, Gd]=ukiok [C.R]=okheark[M.R]=okeoke [Hudson'sBay, H.B=winter]
Axe	galgate [Koriah, Ko]	alghatta, kalkalima [Tch] kalhkanak [Kuskut]
"	inggako [Ko], adaganw [Ko]	amgik [Kad], attighimnuk [K.Sd]
"	tok [Yenesei, Yen], tuk [Yen], tschok [Yen]	tukina-york [M.R]
"	suka [Tuugus, Tng], schuka [Kalmuk, Kal]	tchiklark [M. R] tschikluk [K.Sd]
"	suke[Mongol, Mng],suga[Karag's]	sequetat [K.Sd=knife]
"	yoki, teyok, ono [Jap]	anao-tark [M.R=tomahawk]
Baby	yaya [Jap], aia [A]	iyaye [M.R=child]
Bad	ashii, ashiku [Jap]; wasa [Loo-Choo, L.C]	ashuruk [Mal], asiuruk [K. Sd] [Kaviagmutes] assilewok [Lab, he is bad]
"	aku [Jap]	ajor-pok [Gd], ayor-tork [M.R]
"	achali [Ko]	asselrok [Koniagmutes, Kad]
Bark(of tr.)	kuori [Finn, F], kar [Lapp. L] ker [Vog], koor [Esthonian, Esth] ker[Mordwin, Mord], kereg[Mag]	kreyrork [M.R]
Bathe	abi, abiru [Jap]	iperak-toark [M.R]
Bear (animal)	utege [Mng]; etego [Kal]; ottugu [Buriat, Bur]	aoutkliut [M.R]
"	ogougouk [Yak]	aho k[M.R], artooktar [C.Sd, cub]
"	aju[T], atik [Uigur, U], keki [Tng]	akhlak [Lab]
"	kuma[J], kamui[A], kom[Cor'n, C]	tsunak [Kad], kainga [Tch]
Beard	hige [Jap]	uika [Tch], ugat [Stuart Island]
Beautiful	hanayaka [Jap]	anana-uyoark [M.R]
Beaver	chattala [Tung]	keeyeak [K.Sd], kigiak [Kuskut]
Beginning	okori [Jap]	ako, akugu [M.R=at the beg.]
Behind	okee [Jap]	akro [M.R, back of boat]
Belly	ksuch [Kamtchatka, Kam]	akscheka [Tch], aksiak [Kuskut]
"	ikivan [Jap, stomach]	ihgain [Ch. R]
Berry	ichigo [Jap]	atcidjet [M.R], asheuk [Mal]

ESKIMO-TURANIAN.—(*Continued*).

ENGLISH.	NORTH ASIATIC.	ESKIMO.
Bird	gouche [Yak]	kaivak [Tch]
"	gasha [Tng], cicas [Lapp]	kiva [Gd], keewah [C.Sd]
Bite	kuwaye [Jap]	ekashika [Mal]
Black	kytyhalu [Ko]	xachtscha [Al], kachtschik [Al]
"	kad, kathe [Sam], kacth [L]	kakshikluli [Al], kahchehzeek [Unalaskan, Un]
"	kuroi[Jap], chara [Kal, Mong, Bur]	herniuk [H.B]
"	kara [T], koungourre [Yak]	kernwor [M.R]
"	kunni [A]	kaugnoak [K.Sd], kenertork[C.R]
Blood	hem [Sam], kem [A]	amak[Un], aameyek[Al], amax[Al]
"	akai [Jap = red]	auk, [Gd, K.Sd, Kad] auku [Tch], awk [M.R]
Blue	geuk[T], kuox[Jak], chuku[Mong]	tugun-yortork[M R]tchuagat[Ku]
"	koke[Kal], koku[Bur], tuma[Kott]	kaoogliak[K S], toomook-took[CS]
Boat	hajo [Mag = ship]	kajak [Gd, Kad, Tch] kaiyak[H.B, K.Sd], kyak[C.Sd]
Body	jessed [T]	aseet [K.Sd]
Bone	czont [Mag], konti [F = femur]	tcaunerk [M.R] tcheonok [Tch = horn]
"	hone [Jap]	heownik [H.B], xagnax [Al] sowner [C.Sd]
"	kotham [Ka], kotz [Jap]	keatcik [M.R = shoulder-bone]
Bosom	mell, melly [Mag]	milluk [M.R]
Bow	chiiutsch [Yen], chii[K], jait[Vog]	saeheek [Un]
"	jugut[Ost], jouchs[Mord], joutsi[F]	ssaigich [Al], tchaikak [Tch] setka [K.Sd]
Bowels	whiuigl [Yen]	erglo [M.R]
Boy	oongua [L.C]	einyook [K.Sd]
"	tungpoka [C]	tanoghak [Kad]
Brain	keigane [Yen]	koki-tuk [C. Sd]
Branch	oksa [F], okad [Hung]	akpwit [K.Sd]
	oks [Esth], uks [Tcheren]	
	oge [Kott], eag [Yen]	
Breast	mail[Vog], mejl[Ost], melly[Mag]	milluk[MR]sokedjuck[CS b. bone]
"	tschadji, shadsi [Kal], tegga[Yen]	tschaky-jak [Tch] sekki [Gd], tshaguga [K.Sd]
Breeches	khott [K]	kuttik [Tch]
Brilliant	haje [Jap], oluma [Kott, bright]	ajut[Gd=sun] alla-ki-wok [Lab, a bright sky]
Brother	aki[Tung. Mong], acha[Mong Kal]	agituda [Al]
"	achai [Bur], acho [Kal], akihu [A]	aka [M.R=sister] ukana[M.R = b.-in-law]
" (elder)	ani [Jap], aniki, anigo [Jap]	anayoa [M.R], anaga [Kad], annak [Kusk]
"	eninichse [Ko]	annoaga [H.B], aninger [C.Sd]
"	eninelcha [Ko]	anechluktik [Tch]
"	tschangkuon [Cor]	kamgoyak [Tch]
Burn	yaku, yuku [Jap], akka [L. Ch]	ukga[C R] = ikkooma[H B = fire] okko [H.B = hot]
"	egi [Mag], egni [Mag]	ikinerk [M.R = fire] ikipa [Gd = sets fire to]
But	hanem [Mag]	ami [M.R]
Buy	hok [A]	juocho [Kad]
Cast (v)	utcharu [Jap]	igitoark [M.R]

ESKIMO-TURANIAN.—(*Continued*).

ENGLISH.	NORTH ASIATIC.	ESKIMO.
Cheek	gan [A]	keniak [H.B=face]
"	kolleden, goleden [Yen]	ulloak [Lab], ooluak [Kad ; ooloak [C.Sd]
"	cholan [K], holan [Yen]	oolloohak [Un], uluha [Al] ouluat [K.Sd]
"	galcha [Kal]	uluak [M.R], ulugach [Al]
Child	yaya [Jap], aia [A], ahai [Cor]	iyaye [M.R]
"	hekazu[A], kuken[Bur, kuk[Mng]	kikooshka [Mal]
"	ogo [Tak], ogul, oglan [T]	eegeelugugaga [K.Sd]
"	uli, aljukan [Tung]	
"	unoka [Mag=grand c.]	einyook[K.S=boy]ernek[G=son]
Chin	uljis [Vog], all [Mag]	ulloak [Lab], uluah [M.R]=cheek
"	ul [Mordw], tak [Cor]	uluha[Al],ooluak[Kad]=cheek taklu [M.R]
Cloud	tul [Wog]	tali-guk [cloudy, Kuskut]
Cold	kangiru [Jap], inginikde [Tung]	kinanach [Un], kinganak [Al]
"	koenetsch [Ka]	kanjukukok [Tch]
"	kylma[F],galmes[L], keilm [Esth]	allopah [Mal] allapah [Kaviagmute, Kav]
"	tsar [Cor], szoug [T]	tcermik [M.R=ice], sikko[Gd,H.B],tciko[M R=ice]
"	kideq [Mag], iyich [Ost]	ekkee[H.B],eke[S.B], ikkee[C.Sd]
"	kai [Sam],kyrs [Syr], kyzem [Tch]	keja[Gd]kairunga[KSd,shivering]
Come	ki, kuru [Jap], tschi [Tung]	kaiyok [Ch.R], kraoark [M.R] tiki-pok [Gd]
"	kokwasitch [Ka]	cakine[Mal]kiyeet[CS, come here]
"		kai-wok [Lab, he comes]
Companion	hobai [Jap]	aipak [Gd]
Copper	aka-gane [Jap], gane, kane [Jap=metal]	kanooyak [H.B] kannoyark [M.R]
Cord	nawa [Jap]	nuyark [M.R]
Crow	chulac [Ost]	kalnak [Kad], kalkahym [Un] tooloosk [K.Sd]
"	xolat [Yen], hollo [Mag]	kalkagiak, kalngak [Al], tooloosh [C.Sd], kallugak [Lab] kolhkaguk [Kusk]
Cry	kjelem [Ost], jaj [Mag]	kyrook [K.Sd], keyya [Kad], keja [Gd, Kad] kia [Tch]
Cut	vag, vag-ni [Mag], szeg-ni [Mag]	chaggidzu [Kad]
"	hayashi, kedzru, hatzdru [Jap]	
Dark	charanchoi[Mong], charanga[Kal]	kerniuk[H.B],kernwor[MR=blk]
Daughter	aj, jea [Vog]	iyaye[M.R=chlld], punne [C.Sd]
"	pun [Yen], pun [K]	pannik [Gd], pannika [Tch] pannia [Gd, H.B]
"	punna [Yen]	puneeguhMa, Ka,[Unalig'e, Unalg
"	niraika [Mong	niviertearк [M.R], newekik [Tch]
"	ukin, ugin [Mong]	achadok [Un] aggeakak [Koniag=girl]
Day	hallugg [Ka], halui, halo [Ko]	ullit [Gd]
"	jalle [Sam], yeld, dialle [Tawgy]	illa-ıyak [C.R=sun]
"	chald[Ost=sun],jalakas[L=light]	kowlukpoo [C.Sd=dawn]
"	ii [Yen], ig [K], jale [Jurak]	ajut [Gd=sun]
"	nichi [Jap], na [Yen], nai [Ost]	neiya [H.B, K.Sd=sun]
"	cheg, chokene [Yen]	sekkenek [G],tschenanek[T=sun]

ESKIMO-TURANIAN.—(*Continued*).

ENGLISH.	NORTH ASIATIC.	ESKIMO.
Day	ekn [Yen]	igniuk [Kuskut]
Deer	yuk [A], tooky [Tung = elk]	tuktu [S.B, K.Sd, M.R, r. d.]
Devil	tschitkjr [Mong], tschilkir [Kalm]	tchiutilik [M.R]
"	chuische [Yen]	
Die	gokiyo [Jap], hogiyo [Jap]	toko [S.B, and Gd = death] togu [Kad] tokok [Tch] tukahiouk [C.Sd, dead]
Dog	kanak [Sam], chin [Jap]	keimeg(HB, Winter Isld = W.I) kenma (K.Sd)
	ken [Chinese], kan [Aino]	kemek (Gd), kymyk (Tch) kooneak (K.Sd)
		kummek (C.R), camukta (Mal)
		kingme, kimak (C.Sd)
Door	uba [A], uvi [F]	upkuark (M.R)
Drink	jyäm [Tcher]	immiek-poke (H.B) imerk-toark (M.R = he drinks)
"	inni [Mag]	emik-took(C.S), emoon, emug(K S)
Duck	galle [Ko]	galgagalachi (Tch) olua-ulirk (M.R = goose)
Ear	schen [Tung]	schijun (Kad), tchinik (M.R) tchintak (Tch)
"	kuo, ku, chu [Sam], kui [Cor]	ciun (Ch.R), tciun (M.R)
"	tchiki [Mong], tschekin, tschiken [Kal]	tciutik (M.R), suit (Gd), seeatee (C.Sd)
"	tschikin [Bur]	tscheeutik, shudek (K,Sd), tschuat (S.I)
Earth	na[Tung], ma [Mag, Esth], maa[F]	nuna(Gd, H.B, Mal, Kad, Tch, M.R)
"	mu [Vog, Ost ; Syranian, Syr] mon [Sam]	nunneh (Kav), nounah (Nushergag, Kuskwog, Chugach)
"	ttati [Cor]	tshekak (Al), tchikitch (Un)
Eat	sogo [Yen]	xagata, xaxujing (Al)
"	ja-mak (T), kuta (Jap)	kajuhin(Al), kada (Un), naga(Tch)
"	ideku (Mong, Kal), idyku (Bur)	ashadlooik (K.Sd)
Egg	muni (Sam, Vog), muna (F)	manik (Gd, M.R) munnik (C. Sd)
"	munna(Esth) muno(Tch) mun(Ost)	mannig (H.B)
"	muno(Tch) monn(Vog) mony(Mag)	mannik (K.Sd)
Elbow	hyi (Jap)	ikkuik (C.R), equeesik (C.Sd)
Elk	tooky (Tung)	tuktu-oma (M.R)
Empty	kara (Jap)	tchuar-toark (M.R)
Enough	aku (Jap)	axo (C.R)
Evening	ehtoo (F), iet (Vog), itu (Ost)	uata (M.R)
"	udesi (Mong), udysche (Bur)	
"	aathin (Ka), ud (Sam)	uavara (M.R)
"	yube (Jap)	upuk(Tchuakkak Island, Tchu. I, = night)
Eye	andju (Yuk)	enga (K.Sd), ingalak (Kad) enga (Nort. Sd)
"	ihsah (Tung), esha (Tung)	irsik, irse (Gd)
"	hai (Sam), ya (Aino)	eieega (H.B), aiiga (W.I) iye (Lab), eyah (C.Sd)
"	chik, chuki (Aino), chigi (A)	iik (Tch), ik (S.I) igikka (Nuniwok I, Nun. I)
"	tesch (Yen)	takchiuk (Tschugaz, Tschug) shik (H.B)
"	dat (Yen)	thak, dax, tgak (Al)

ESKIMO-TURANIAN.—(*Continued*).

English.	North Asiatic.	Eskimo.
Face	gan (A = cheek)	keniak (H.B), keenyuck (Mal), kinna (K.Sd), kenak (Lab), kinark (M.R), keenark (C.Sd) keenuk (K.Sd)
Fall (v)	ochiru (Jap)	yuka-tork(M.R)eyukar-took(C.S)
Father	tete (Jap), acce, tatta (L)	attata (Gd, H.B, W.I) ataga (Kad), ada (Al)
"	atja(Sam),achai(Sojot), jag (Wog)	atatak (Gd, M.R), ataaka (Tchug, Kad)
"	ata (Ost, Mordw), atai (Syren)	atakka (Nun.I), adaka (S.I), adaga (Kad)
"	atya (Mag), etschia (Yuk)	atanna(Tschu.I), atta(H.B,Tch) athak(Un),atti(Kuskutchewak)
"	etschiga (Kal), aga (Turk)	ataak (C.R), ataka (Tch) athan, adax (Al)
"	ob, ab, op (Yen), apa (Mag), op (K), abe (Mong), api (Cor)	pân (M.R)
"	illegin(ReindeerTschuktchi, R.Ts)	illaak (M.R = père et mère)
Father-in-law	appi (F), up (Wog), up, op (Ost)	apan (M.R = father) father]
" "	oba (Tcher), vuop (L)	abaga (Kad), apaka [Tch = grand-
Feather	kyna (F)	tchunerk (M.R)
"	tegöl, tegelin (Ko)	tschuljuga (Kad)
"		tschully, tschuljuk (Tch)
Female]	onna (Jap)	anrenak(C R),arne(MR),agna(Gd)
Fingers	tarka (Sam), tarka (F)	tirkerit(Gd),ekikoke(KS,lit.fing.)
"	togan (Yen, Kott), tegen (Yen)	tegheya (K.Sd)
"	tok (Yen), tilghuni (Ka)	tikkiek(H B),teekeeur(CS = ind.f.)
"	tjute (Syrn), tjute (Lapp)	atchon,atchuk(Al),agssuit(Gd), kigyuck-thuk (C.Sd, sec. fing.)
"	gyhgek (Ka), keko (Ka), uj (Mag)	ekkaikak(C.R), aiget(Kad = hand)
"	tekbet (A)	taibano(Tch), ikikote(C.Sd = lit.f)
Fingernails	toukigni (A)	tegheya (K.Sd), tikkiek (H.B = fingers), koogay (K.Sd)
" "	chada (Sam), kad (Ost), kacth (L)	shetooe (K.Sd), xatalgi (Al), chagelgun (Al)
" "	keko (Ka = finger),kadam (Motor)	kukek(M.R), kookee (H.B. and C.Sd), kookuikka (K.Sd)
Fire	agoime (Yakut)	ikkooma (H.B), ikkoma (W.I) ikoma (Lab)
"	ku (Yen)	ukga (C.R), ikomar (C.Sd)
"	engilo (Yuk)	ingnek (Gd), ignik (K.Sd)
"	ountchi (A)	annak (Tch)
Fish	kalla, kaul (Sam), kala (F)	ekkhaloo (H.B), ikkaluk (C.Sd)
"	kole (Tawgy), kal(Mag), guolle(F)	khalloo (K.Sd)
"	kul (Wog), hul (Ost), kalla (Esth)	ikaljuk (Kad), ssaljuk (Tch)
"	kal-mach(Suan),kol(Tch),xul(Ost)	ihahluk(Tch) ikalouk(Kuskwogm)
"	kola (Koibal), kele (Motor)	itkraluk (M.R)
"	olla (Tung), olloga (Yuk), ilti (K)	ilook (Ch.R)
"	koki, kuki (Cor), giyo (Jap)	kach (Un), koach (Al) tchadak (Ulagakmute)
"	tolgo (Cor)	talechnika (Nun.I)
Flesh	niogo (Ost)	naga(Ma),naka(Tch),neerkee(C S)
"	niku (Jap)	neke (Gd), nikkey (C.R) nerkre (M.R), neerkee (H.R

ESKIMO-TURANIAN.—(*Continued*).

English.	North Asiatic.	Eskimo.
Flesh	koki, kuki (Cor)	khach (Al)
"	kam (A)	kurnüka (Tch)
Fog	kaasu (Finn), giz (Hung)	iseriak (Lab)
Foot	iyic (Sam), ajak (T)	isiket (Gd), ittikeik (H.B) itigark (M.R), issekut (C.Sd) iguk (Kuskut)
"	atax (Jak), atak (Uigur)	iddiguy, etscheak (K.Sd) itiat (Kad), igut (S.I)
"	goutch (A), kok (Syrn)	igugu (Kad), igık, iuchka (Tch) iug (Kad)
"	anin (Yen)	iniija (Kad)
"	noigi (Yuk)	niuik (Gd)
"	ashi (Jap), tsja (Cor)	etscheak (Nor.Sd), tsha(Al = hand)
"	jalka (F), juolgge (L), jalg (Esth)	iltegara (K.Sd)
Forehead	kat (Turak)	kauk (Gd)
Forest	hayashi (Jap)	kayak(Ch.R), keiyu(K.Sd = wood)
Fox	kettu (F)	kioktoot(KSd)kavhiatchak(Kusk)
Frost	tsar (Cor), cigu (Kor, ice)	tcermik (M.R = ice) keegkeyook (C.Sd, freeze)
Girl	ajadkann (Tung)	ashkin (Al = daughter)
"	achanokin (Bur)	aganagach (Tch)
"	akin (Mong), ekin (Kal)	achadok(Un), aggeakak(Koniag) aganak (Kad)
"	kangag (A)	kangneen (K.Sd)
"	puna, pun, (Yen), pun (Kott)	puneeguh (Kaviag, Mal)
Go	anuga (Kott), ini (Jap) genigar (Tung)	annee (H.B), aunee (Mal)
"	iku (Jap), utashish (Ka)	icha (Un), itscha (Al)
God	etsch (Yen), esch (K)	istla (Tch)
Good	eju (T)	azik-toak (Koniag)
Goose	gala, guleu(Mong)galun(Kal&Bur)	olua-ulerk (M.R)
"	chalacho (Mong)	elajagin (Al), lachlah (Tch)
"	tschem, tem (Yen)	timmiak(C R), timairik(KSd, bird)
"	schame (K)	tigmerk(M.R), tchimiak(Stuart I)
Grandchild	unoka (Mag)	anektok (Un), anekthok(Al = boy)
" "		einyook (K.Sd = boy)
Grandfather	ob, obo, ab, op(Y), aba(Mong = fath)	abaga (Kad), apakaka (Tch)
Grass	ebesu (Mong), ibysu (Mong)	ebouit (K Sd)
"	ibisun (Kal), ebuhun (Bur)	eewuk(Tc), iuik(Gd), eeweek(H.B)
Gravel	jari (Jap)	siorak (Gd)
Grease	aki (Jap)	ukuk (Ch.R)
Great	oki, woki (Jap), uwhoko (L.C)	uguyuk (C.R)
"	okdy (Tung), agge (Sam)	kaaguk (Tch)
"	ent (Ost)	ange-woke (H.B), angi-doorak (Mal), anguk (Kad)
Green	koku (Bur)	okok (C.R), okok (K.Sd)
"	jukusan (Jap)	okrork (M.R)
Hair	nurikta (Tung)	niyet(K)nuchet(KS), nuyark(MR)
"	nochon (Bur)	nuyakka (H.B), nuyak (Tch) newyark (C.Sd)
"	tscherachu (Kam), tchertch (A)	krariark (M.R), kreyerit (M.R)
"	tenge (Yen)	tinge (Gd)
Hand	ka, kha (Bur), char (Mong)	yagatchutuik (Kuskut)
"	gar (Kalm), khae (T)	arge-gei (K.Sd), argut (C.Sd)

ESKIMO-TURANIAN.—(*Continued*).

English.	North Asiatic.	Eskimo.
Hand	chketch (Kam), giette (L), kete(T)	tathchka (Tch), ashigite (Mal) ashet (Kad)
"	kat(Vog), ket, kot (Ost), kez(Mag)	aishet (K.Sd), aidgeit (C.R)
"	kässi(Esth).ked(Mord),ket(Tcher)	
"	tek(A), tag (Mag = limb)	tsha, tshax, dax, tshaq (Al)
"	ude(Jap),udam(Motor)oda(Koib'l)	aidge t (C.R)
"	settoo (Kam). soan (Cor)	chianh (Un)
Hare	kuolbax (Jak)	quelluk (K.Sd)
He	oan, onno, unin (Ko)	oona (Kad), una (C.Sd)
"	unian (Kott = they)	inan(Un)una(Unalig, Mal, Konag)
"	tep, tap (Ost)	tabioma (M.R)
Heart	waima (F)	umat(Gd),oman (M.R),omut(H.B)
"		oomut (C.Sd)
Heat	honoke (Jap), chalchun (Mong)	uunakun (C.R), onark (M.R) kalhtok (Kask)
High	magas (Mag), ura (Tung = mount)	mugwee(KSd = mount)arana(MR)
"	togam, togardu (Yen)	taki-york (M.R)
"	taka (Jap), takai (Jap), uiga (Yen)	yukhtuli (Tuskut)
Hold (v)	tomeru (Jap)	tigumcaria (M.R)
Hot	honoke = heat (Jap)	unartork (Gd), oooonah (C.Sd)
"	hoteru (Jap), attisa (L.C)	uterana (M.R)
House	uche (Jap), katchi (L.C)	itcark (M.R), kagsse (Gd)
"	zibu, tschap, tschibi (Cor)	topek (Mal), tupik (C.Sd, tent) toopek (K.Sd)
"	ke (Jap), ije (Jap), koutcha (A)	tcay-rark (M.R)
Hungry	kogat (Yen), kajagunau (Kott)	kajuhin. xagta (Al = eat)
"	khogat (Kott)	krak-twark (M.R)
Husband	anhai (Cor)	anhut (C.R), anhun (M.R)—male
"	okai (A)	uika(Tch), ugi (Al), quaoog(K.Sd)
"	ukko(Fin), ika (Ost, married man)	uiga (Kad)
I	ware(Jap),mon(LVot),mani(Sam)	uwanre (C.R), umana (M.R)
"	ai (Kott), ain (Kott)	huih (Ekogm), goona (Chukl)
"	abana (Ten)	uvana (M.R), oovenir (S.B) oowungar (C.Sd)
Ice	cigu (Ko), djuko (Tung)	tschikuta (Tch), sikko, seko(Gd) seko (Mal)
"	jagna(F), jeg (Mag), juchi (Mdsch)	sikkoo (H.B). tciko (M.R) chikoo (S.B), seko (C.Sd)
"	sok (Sam), szoug (Turk = cold)	tchiko (Kuskut), siko (Lab)
"	ser (Sam), seren (Sojot = cold)	tcermerk (M.R), sermek (Gd),
"	jarka (Tuk), tsar (Cor = cold)	quark (C.Sd = frozen)
In	ni (Jap)	nê (M.R)
Iron	soi (Cor)	souik (H.B), chawik (K.Sd) sevwick (C.Sd)
Island	sziget (Mag)	kechat(Chu),kigyeuck-teuck(C.S)
Kettle	aschwak (Yen)	asok (Kad), aschok (Al)
"	hisage (Jap)	assuch (Al)
Knife	tchako (A)	sequetat (K.Sd) tchiklark (M.R = hatchet)
"	pohrta (Tungus)	peyartuk (K.Sd)
Lake	tuse (Sam), tudjo (Sam)	tessek (Gd), tatcirk (M.R)
"	teu, toux (Ost), to (A), tav (Mag)	touga (Tch), tussig (C.Sd)
"	tur (Wog), turku (Sam)	taerak (Ch.R)
Land	oki (Jap), nane (Lapp, mainland)	oki-tork (M.R), nuna (Gd, H.B, Mal, Kad, M.R)

FSKIMO-TURANIAN.—(*Continued*).

ENGLISH.	NORTH ASIATIC.	ESKIMO.
Land	toi (A)	chiut (M.R)
Large	kogo (Tcher), chaegen (Yen)	uguguk (C.R), kaaguk (Tch)
“	jeke (Mong. and Kalm), jike (Bur)	chakliuk (Kuskwogm)
“	chea (Yen), kogo (Tcher)	yukhtuli (Kusk, high)
Laugh	tschakaigan, tschachajia (Yen)	kachkuktak (Mal)
“	tschakag (Kott), adjagen (Yen)	iglartoark (M.R)
Leave	hanareru (Jap)	anear-tcidjoark(M.R),aniyok(CR)
Lie(ment'e)	esal (Hung)	seglu-vok (Lab)
Life	inochi (Jap), inni (Tung)	innuk-tcark (M.R)
Light(levis)	kine, kannex (Ost)	kamaganak(Kad), kamagluk(Tch)
Light (lux)	walo (F), vilag (Mag)	ullit (Gd = day)
“	jalakas (L)	allakiwok (Lab, bright sky)
Lightning	kjyal (Kor)	kallek(Gd)kalluk(M.R = thunder)
“	silaka (Vol), tschillim (Sam)	shulukshik, ssuljux(Al = thunder)
“	kumylgilat (K)	kraumarklork (M.R) kaomo-woke (H.B = it is light)
Limb	jezshen (Tcher), jesen (F), jos (Vol), ashi (Jap)	isiket(Gd = foot), etscheak(M.R) eshet (Kad = hand)
Lip	kkovan (Ka)	kakkiviar(M.R),kakkerluk(K.Sd)
“	aodjun (Tung), ajak (Mag)	athek (Un), adix (Al)
“	kuchi-biru (Jap)	kotschun (Al), kokslu (C.Sd) kokluk (K.Sd)
“	dudak (Turk), tutkak (Uigur)	toootucka, tootuk (K.Sd, labret)
Living	amidu (Mong, Bur, Kalm)	oma-yoark (M.R)
Long	tate (Jap)	tatuk (Tch)
Love (v)	aiszru (Jap)	atcear-toark (M.R)
Low	ala(F),wuolo(L),ala(Mag),ul(Syr)	allak (C.R = sole of foot)
“	alo (Mord), ylna (Tch), it (Ost)	ochimi (Kuskut)
Male	yu (Jap)	juk (Tch), yuk (Chukl) yut (Unalig = man)
“	osz (Jap), onoko (Jap)	utcuk (M.R), innok (M.R) innuk (Gd. and C.R)
Man	chu (L.C), chujukutsh (Ko)	juk (Tch), shuk (Kad) yugut (Kuskwog), yuk (Ekog)
“	ukko (F), okai (A = husband)	agiun (Nusherg), akwin (Yugal) uika (Tch)
“	ika, ig, ike (Ost) agg (Mag, married man)	ugi (Un), ugin (Al = husband)
“	ickkiega (L.Ch)	juk (Tch.I), yuk (chukluk)
“	ennete (Sam)	innuk(Gd),innuk(C R),innok(MR)
“	innimene (Esth), ihmene (F)	innueet (pl, H.B)
“	ingernin (F)	angut (Gd), angoot (C.Sd)
“	ainu (A)	enyuk (Mahl, Kanagm)
“	anhai (Cor = husband)	anhon (M.R), anhut (C.R)
“	chacha (Tung), tschet (Yen)	shuk (Kad), yut (Unaligm)
“	chicham (A), otoko (Jap)	utcuk (M.R)
Many	oi (Jap)	uwit (C.R)
Metal	kane (Jap)	kanooyak (H.B) kannoyark (M.R = copper)
“	*aka*-gane(Jp, copper, *i.e*, *red* metal)	kannujak (Un), kanuja (Kad) kanuak (Tchugaz)
Moon	kuli (Koibal), gailgen (Ko)	yaalock (Kad) igaliuk (Kuskut, month)
“	ilio (Sam)	illa-uyak (C.R = sun)

ESKIMO-TURANIAN.—(*Continued*).

ENGLISH.	NORTH ASIATIC.	ESKIMO.
Moon	tangkitti (Ko)	tankuk (Tch)
More	enin(F).ena,una (Ost), enny (Mag)	aneyo-mun (M.R)
Morning	oglo (Bur), uglja (Mong)	ooblak(HB),oobliaan(M),xilgax(A)
“	chonnohokse (Yen)	kaomowoke (H.B, it is light)
“	cheg (Yen, day)	kauk (Lab)
Mother	ana, ene (Ost), anai (Vot), ana (T)	annanak (Gd), ananark (M.R) anana (W.I)
“	anguan (Kam), ani, enie (Tung)	ananak (Lab), annaag (C.R) anaha, anaga (Kad)
“	anki (Ost), aingga (Ka), unu (A)	annak (Un), anaan, anax (Al) anak (S.I), annak (Nun.I)
“	angnan(Ko),anya(Mg)onny(Tung)	ainga(Tch),anak(Tch),annaka(Tch)
“	ema (F), immi (Ost), em (Magy) umma (L C)	amama (M.R) ani (Kuskutchewak)
“	am, ama, amma (Yen), ama;(Kott)	amama (H.B)
“	ama, amia (Yuk), amma (Sam)	amma (M.R)
“	elle (Kam), illia (Kam), elha (Kor)	illak (M. R = père et mère)
“	eke (Kal, Bur, Mong) omi (Cor)	okooch (Gd)
Mountain	maki (F), moji (Cor), maggi (Esth)	mugwee (K.S), magoo-magoo (KS)
“	hegy(Mag), kai(Yen),megi (Karel)	kakkak (Lab, Gd), xajax (Al)
“	konnon (Yen)	kinnak(C.R)kingnak(H B&WI) kingyarko (C. Sd)
“	naju (Ko)	najagat (Tch 1), naigak (Tch) kingyi (C.Sd)
“	gyeigoi (Ko), oka (Jap)	gaiuk (Al), kukkuk (S. B = hill) kakkak (Lab)
“	urra (Tung), hegy (Magy)	errarkr (M.R), kakkak (Lab, Gd)
Mouse	gulugana (Mong), gulguni (Bur) chuluchani (Kalm)	kooblaook (K.Sd)
Mouth	zehylda (Ka), ajax (Tak)	agilga(Al)aheelrek(Un)ekigin(Tc) kangyook (C.Sd)
“	khan (Yen), angya (Yuk)	kannek (Gd), kanneera (H.B) kainneak (K.Sd), kanuk (Mal)
“	choby (Yen), kaukasi (F)	kipüch (S.I), kapka (Nun.I), kanik (Kusk), kanerk (Lab), kanna (Tch), kuckaluk (K.Sd)
Night	jut (Tcher), at (Ost)	uata(M.R = even), oodinnook(C.S)
“	anzkari (A), chona (Yen)	unnuak (Gd), oonooak (H. B) unnuak (Lab)
“	kyunnak (Ka), nigynok (Ko)	unjak (Kad), unnjuk (Tch), onuark (M.R)
“	chontu (Kott = dark)	nnuk (Kad), unuk (Tchug) kueeennah (C.Sd, all night)
“	homaly (Mag = dark)	amak (Un), amach, amgik (Al)
No	nai (Jap)	nao (H.B) noki (C.Sd),nao(K.Sd) naukak (Lab)
“	naki (Jap)	nagga (Gd), naaga (C.R) nakka (H.B), nago (K.Sd)
“	ina (Jap), anir (Cor), nem (Hung)	ena (K.Sd), aunga (K.Sd) naume (K.Sd)
“	uinge(Kor),jok(Turk),aku(Mand),	duinak (M.R), kugu (Al), owkuk (S.B)
Nose	kaankang (Ka), hong (Yen)	kinga. kingak (Gd) keinak, kingera (H.B. = my n.)

ESKIMO-TURANIAN.—(*Continued*).

English.	North Asiatic.	Eskimo.
Nose	joonul (Tuk), hana (Jap)	kingak, kingar, kingnuk, kingana (K.Sd), nikh (Kusk)
"	onoktah (Tung), ang (Kott)	kinaga (Kad), tlingyak (C.Sd) nognuk (K.Sd)
"	enku (Kor)	anghosin, angussin (Al) anhozen (Un)
"	chamar (Mong, Kal)	kaymak (M.R)
Ocean	umi (Jap)	imak (Gd, Tch)
Odor	nioi (Jap)	nayak (M.R)
Old	hine (Jap)	anayo (M.R)
Old	aggkor (Mag)	arkro(M.R), iktuar(C.Sd, old man)
Open	akeru (Jap)	okuer-toark (M.R)
"	aku (Jap)	okéun (M.R)
Other side	achira (Jap)	akkian (M.R)
Pebble	jari (Jap)	ujarak (Gd), uyare (C.R) ooyarra (H.B), uyarak (M.R)
Penis	odsogi (Mong), osogoi (Bur)	otcok (M.R)
Perhaps	tabun (Jap)	tabliu (M.R)
Pike (fish)	huja (Yen), chuja (Kott)	tchukoak (Kuskut)
Pole	hagini (Kott)	aiye (K.Sd, post)
Quick	zal (Vol), jel-tak (Tatar)	kelu-mik (Un), krillå-mik (M.R)
"	toku (Jap)	tchuke-york(MR), shookully(C.Sd)
Rain	tshukutshi (Ka)	tshutakat (Al), chehtak (Un) kitok (Kusk)
"	azgatch (Ka)	igesikhtuk (Unaligm)
"	ame (Jap)	imak (Gd, Tch = water)
Raise	ageru (Jap)	agar-tork (M.R)
Red	cholachin (Tung), akai (Jap)	kawychly (Kad), kakluk (Tch) owg (C.Sd)
"	ulachan (Mong) ulan (Kal, Bur)	oolluthak(Un) aluthak, olutuk(Al)
River	kawa (Jap), jo (Mag)	koo (H.B), ku (W.I), kurk (M.R)
"	joki (F), joga (L), jogan, jeaga (Ost)	kuk, kook (Gd), kuak (K Sd) kooyk (Kad)
"	yoha (Sam), djaga (Kamess)	kuuk (C), koouk (K.Sd) coke (Mal), koog (C.Sd)
"	kig, kiha(Ka), ky (Sam), gychi(Ka)	kiuk (Kad), kiuk, kuigytt (Tch)
"	chuge (Ost)	koggut (Lab)
Roast	iru (Jap)	irayuk (M.R)
Root	nuku (Jap)	nakat (C.R), nakatc (M.R)
Salute	jigi (Jap)	tchiki-yoark (M.R)
Sand	jari (Jap)	siorak (Gd), kaguiak (Kuskut)
"	tchigei (Ko)	tschooguk (Al), choohook (Un)
Sea	dagas (Kal)	tagaiuk (Mal)
"	alagas (Kalm), ul (Kott = water)	alaook (Kad), allaook (Un), alagak (Al)
"	umi (Jap), jam (Sam)	imak(Tch), imak(Gd), imik(K.Sd)
Shoes	ken (F), kom (Syr)	kamik (Gd), camook (Mal)
"	kem (Mordw. and Tscher)	kammek (C.R), kamguk (Tch)
Shoulder	kata (Jap)	keatcik (M.R = shoulder-blade)
Sing	utau (Jap), oota-yoong (L.C)	atuwa (Kad), attoa (Tchug) atuchtuk(Tch), ator-toark(M.R)
Sister (eld)	ane (Jap)	oonheen (Un). angeen (Al) anoyuma (M.R)

ESKIMO-TURANIAN.—(*Continued*).

ENGLISH.	NORTH ASIATIC.	ESKIMO.
"	nyy (Syr). ni (Ost), Lapp)=girl	naya (M.R), najak (Gd) neiya (H.B), najahak (Tch)
" (ygr)	oki (Tung), akiu (Mong), okin (Kal=girl)	aka (M.R)
"	hug (Mag), oggug (Ost)	aggeakak (Koniag=girl)
"	nenye (May)	nayunga (S.B)
" in-law	tschaqudo (Ko=sister)	tcakia (M.R)
Skin	nakha (F)	nakka (Tch)
"	kit (Yen), haj (Mag)	katschka (Al), kesheke (S.B)
"	kapu (A)	kaypak (C.R)
"	gameutch (A)	amek (Gd), amik (Tch) amerk (M.R), amingk (C.Sd)
Sky	kochall (Kam)	kreylark (M.R), keilyak(K. Sd) kaillek (C.R)
"	ame (Jap), hanar (Cor)	ineg (Al), innyak (Un)
Sleep	uni (F), on (Syr, Perm)	wine-rark (M.R)
Smoke	utachan (Mong), ura (Kal)	itcirk (M.R), eshik (C.Sd) eshak (K.Sd)
Snipe	nokaky (Tungus)	nucktooalit (K.Sd)
Snow	upas (A), oubach (A)	uphun (Mal), ahpoot (S.B) apun (M.R), appoo (H.B)
"	tik, tyg (Yen), tik (Kott)	ktak (Al), tciko (M.R=ice) appoo C.Sd)
"	char (Sojot), char (Jck), qar (T)	ser-mek (Gd, ice)
"	anighu (Kor)	annu(Tch),annju(Kad),anniyo(MR)
"		kanneuk (H.B), kanneek (Al) anigo (Gd)
"		kanik(Ma),kanneek(U),kanich(Al)
Son	hyat (Ten)	iyait (C.R)
"	ochul (Turk), uol (Jakut)	lljax (Al), alaan (Al)
Song	uta (Jap)	atoron (C.R)
Speak	kyleku (Mong) kelaku (Kalm, Bur)	kroléartoark (M.R) kalkhtuik (Kuskut)
Spoil	azareu (Jap)	awtcadje (M.R)
Squirrel	sak, schaga (Yen)	tseyherek (K.Sd), shiksik (C.Sd)
"	schaga (Kott)	chikirik (Mal)
Star	alak (Yen), alagan (Yen, Kott)	ubloat (Mal), ublo-reark (M.R)
"	kaken (Yen)	sthak (Al)
"	ilkhoi, alagan (Kott)	illa-uyak (C.R, sun) yaalock (Kad, moon)
"	alak, alagan (Yen)	ialktagit (Tchu, I)
Stone	jari (Jap)	uyare (C.R),wearzook(C.Sd,rock)
"	whraugon (Ko)	ujarak (Gd. and Lab) ooyana (H.B), weark (C.Sd
"	uva (A)	iugach (Tch), uyarak (M.R)
"	hyme (Tung), chuma (A)	yamak(K.Sd), anmark(M.R, flint)
"	kiva(F), kav(Mag), kevi,kew(Ost)	angmak (K.Sk)
"	ki,kev(Mag),kev(Mor),ky(Tcher)	aigach (Tch)
"	kiwin(F),kow(Wog), kock,kug(O)	kooooanak (Kad), kaertok (M.R)
"	guiven, kugun (Ko)	uigum (Tch)
"	tscholo (Mong, Bur), tschulu (Kalm)	krawlork (M.R) kallook-rowrork (K.Sd)
"	kiroi (Esth)	tkalkhuk (Kuskut) kaertok (Lab)

ESKIMO-TURANIAN.—(*Continued*).

ENGLISH.	NORTH ASIATIC.	ESKIMO.
Summer	djoganna (Tung), shak (A)	kuiga (Tch), kyiga (Tch)
"	schega (Yen), schii (Kott)	kiek (Gd, Kad)
Summit	chojo (Jap)	gaiuk (Al, mountain)
Sun	schigun (Tung)	sickunyuk (Mal), sukkenuk (H.B)
"	ziguni (Tung), tirgani (Tung, day)	tchikreynerk(M.R), sukenuk(C.S)
"	tykete (Ko)	tschekenak (Tch)
"	schunda (Vot), syunk (Vog)	sakkainek (C.R), sackanach (Gd)
"	schun (Tung)	tschinguguk (Kad) tschingochok (Tchug)
"	naj (Wog), nai (Ost), nar (Cor)	naiya (W.I), neiya (H.B, K.Sd)
"	ega (Kott), ega (Yen)	ajut (Gd)
"	hichem (Yen)	akkta (Kuskut)
"	xat (Ost), hajur, chaja (Sam)	agạdak (Al)
Sweet	amaku (Jap)	memak (W.I)
Swim	uin (F), joon (Esth)	anoarktoark (M.R)
Take	tiru (Jap), ukeru (Jap)	tiruyok (C.R), akwaron (M.R)
That	ani (Jap), una (Kott)	igna(M.R),oana(K.Sd),oona(H.B)
They	unian (Kott), ik (Mag)	ina-kun (Al), okkoa (M.R)
This	tarna (F), tan (Iuk)	tamna (H.B), tamāna (M.R)
"	inu, ina (Kott), ano (Jap)	una,imna,igna (M.R), oona (K.Sd)
Thou	ton (Mord), tshi (Mong, Bur)	txin (Al), thinn (Un)
"	ton (Lapp), tan (Ost)	tschi-tschi (Al)
Throat	turkku (F), torok (L) tur (Ost, Vog)	tukku-eyak (C.R) tokelooga (H.B, neck)
"	kurku (F), kurk (Esth) karges (Tcher)	krakerlut (M.R), tookooedjik (C.Sd)
"	kiuch (Ka)	uyak (M.R), iaak (Tch)
Thunder	kjyhal (Kor), tschillim (Sam)	kallek (Gd), kalluk (M.R), kodahlook (C.Sd) kalik (Kuskut)
"	ajak (Kott), aggdy (Tung)	ukga (C.R), ikkoome (H.B = fire)
To-day	ena (Yen), inni (Kott)	wanni (Tch)
"	inagi (Yen), innag (Kott)	vonnangalik (Al)
To-morrow	huommena (F)	anuoaga(Kad), unako,unnok(Tch)
"	hol-ejt (Wog), hol-val (Hung)	ullit (Gd, day)
Tongue	onnior (Iuk), ynije (Tung)	ahnak (Un), aghnak (Al), ookwaa (K,Sd)
"	njouktem (L), jilme (Tcher)	agonok(Kad), oguark (C.Sd)
"	kieli (F), kial (L), kiel (Esth), kyl (Syr)	ulju (Kad), alianuk (Kuskut,
"	keleu (Kalm), kylyn (Bur), aljap (Kott)	ulliu (Tch), uliupa (Tchu.I)
"	ulygyl, ul (Ko), alup (Yen)	uliu (S.I), uliuka (Nun.I)
"	kele (Mong), iilygyl (Yen)	ulu (Kad) ulliu (Tchug)
Tooth	iet (Yen), iti (Kott)	wuttinka (Tch), gutyk (Tch)
"	ykta (Tung), tody (Iuk)	chudyt (Kad), keeutee (C.Sd)
"	tjiio (Jurak), tji (Yen)	tcivorak (M.R), kewkleet (K.Sd)
Tree	ocho (Yen), okse (Yen)	okpik (Lab, birch)
Uncle	acha (A), hai (Kott)	aka (Gd), aya (M.R, aunt)
Under	ala (Mag)	allak (C.R, sole of foot)
Up	kami (Jap)	kronmun (M.R)
Valley	kuki (Jap)	kuk (Gd)
Walk	ariki (Jap)	arayoark (M.R)
Warm	kuuma (F)	kaomet (Gd = sun), kaomo (H.B = light)

ESKIMO-TURANIAN.—(*Continued*).

English.	North Asiatic.	Eskimo.
Water	umi (Jap)	imek (Gd), immek (C.R, H.B) emuk(S B), imik (K.Sd)
"	ame (Jap, rain)	imuk (Mal), emak (Tch) imark(M.R), immek (Lab, W.I)
"	mima (Kam)	mmak (Tchugaz), emik (C.Sd)
"	mu (Tung)	mooe (Kad)
What	dono (Jap)	tchuna (M.R)
White	haku (Jap), attych (Kam) zagan (Kalm, Mong)	kakoktok (C.R), ikuk (S.I) kaggarkpok (Lab), kokuktoo(CS),kragartork(M R)
Who	kuk (F), gutte (L), kije (Ost)	kuja(M.R), kaia(Kusk), kia(Lab)
"	ki (Mag, Tcher) kia (Mord), kua (Tawgy)	kia (M.R), kiva (M.R), ke (Kusk)
"	gidji (Kam), kud, kut (Sam) joka (F)	kina (M.R), keena (Mal) kena (H.B), kina (C.Sd)
"	kuka (F), koje (Ost), kona (Mag=what)	kitcik (M.R), kikut (M.R)
"	kumi (Tawgy), hunjani (Tur) hibea (Tur)	tchuna(M.R) tchuva(M.R=what)
Wife	kanai (Jap), aji (Tung)	xenenlie (C.R), agegai (Un)
"	heghe (Tung, woman)	aiyagai (Al)
Willow	schakta (Tung)	tchagatuit (Kuskut)
Wind	kei (Bur), salki (Mong) salkin (Kalm)	kyeek (Kad), silla (Lab) sulluarnek (Lab)
"	kyttych (Kam), kyteg (Kor)	kycheek (Un)
Winter	achsachsan (Kam)	ukshiok (Kad)
"	eschiu (Yen)	uktschok (Tch)
Wish	hosshi (Jap), honi (Jap)	itchuma(M.R),uninmartork(M.R)
Wolf	chgahun (Kor)	kagopik (Nun.I)
Woman	alit (Yen), alit (Kott)	oolea (K Sd)
"	innago (L.C), onna (Jap)	anak(Chuklukm), anrenak(C.R) oongnak (K.Sd)
"	heghe (Tung)	anhanenak (Un), aganok (Kad) agna (Gd)
"	cheche (Tung)	ajagax,aajagan (Al), okanok (Mal)
World	sekai (Jap)	tshekak (Al)
"	chikui (Jap)	cheke (Un)
Yes	hei (Jap)	eh (Kad), ah (M.R), a (K.Sd)
"	igen (Mag)	aak (Gd)
Yesterday	jaino (Jap), cheenoo (L C)	jani (Al)
"	khanj (Kott), chondj (Yen)	kingulerk, kinuleytork (M.R)
You	ekn (Ien), ti (Mag)	igoete (S.B), txi(Al), ichbin(C.Sd)
One	itik (Syr), egy (Mag), egid (Ost)	attakon (Al), atchig (Chukluk) attauden (K.Sd) atauyak (C.R), atik (Unal, ten)
"	yksi (F), auft (L), aku (Vog)	atousik (S.B), atoken (Un) atashek, attaglik (Al)
"	uks (Esth), ok (Tcher), akte (L)	atchimouk (Chugachm) atauckik (Ugalak)
"	ifka (Mord), akva (Wog), yhte (F)	atowsik (Unaligm, Male) atauchik (Kusk, Nusherg)
"	hito (Jap), istsuka (Jap)	atawtschik (Nun, W.I) atowchuk (Ekogm)
"	hutsha (Kott)	attausek (Gd), attowseak (H.B) ataotcirk (M.R)

ESKIMO-TURANIAN.—(*Concluded*).

ENGLISH.	NORTH ASIATIC.	ESKIMO.
One	oker (Ost, Sam)	acheluk (Koniag), autowzig (C.Sd)
Two	malgi-jelokon (Juk, 8, *i.e.*, 2x4)	malgook (Chugachm) malogh (Kad), malkhok (Kusk) millei-tsungnet (K.Sd)
"	malgi-jalon (Juk, 6, *i.e.*, 2x3)	malruk (Mal), mallok (Kad) malguk (Tch), mallerok (M.R)
Three	jalon(Tuk), ilan(Tung, Mandschu)	illaak (M.R)
Four	tjet, tjiet (Jurak)	setemat (Mal), sittamet (Lab)
"	tet, tiet (Ost), thede (Kamass)	sheetimut (S.B), sittamat (H.B)
"	tjata (Lawgy), teto (Jen)	tsetumet (K.Sd), tcitamet (M.R)
Five	xa (Syr)	chaan (Un), chang (Al)
"	itsu (Jap)	atyoon (Un), attoon (Al=6)
"	sundza (Mandscbu)	tshang (Al)
Six	malgi-jalon (Juk, 2x3)	malgok(Tch), malkhok(Kuskg=2)
"	zorgan (Bur), jirgogan (Mong)	argwenrak(HB), arveneloerit(MR)
Seven	dologan (Mong), dolon (Bur)	talang (Un)
"	xelina (Kott)	olung (Al), oolloon (Un)
Eight	malgi-jelokon (Juk, 2x4)	malgok (Tch), malkhok (Kusk=2)
Nine	uijun (Mong), jagin (Tung)	aghinluk (Tch)
"	tshumnaga (Kott)	stamma (Tch) chtamiakoanan (Kuskwog)
Ten	iel (Corean)	ullia (Tchuakak I) koela (Chukl), kulle (Tch)
"	kunoleu (Juk)	kulen (Kad), kullnuk(Kuskwog) kollit (Gd)

GRAMMATICAL RESEMBLANCES.

Between the Eskimo language, and the Turanian tongues of North Asia, besides the numerous coincidences in vocabulary noticed above, there exist many remarkable resemblances in the general character of grammatical structure which at once strike the student of comparative philology. In Eskimo, grammatical particles are suffixed only, which is the case in several N. Asiatic tongues, although not so absolutely as in Innuit. The suffix of the *dual* number is in Yurak *ha*, *g*, *k*; in Ostiak, *g*, *k*; in Tawgy, *gai*; in Jenesei, *ho*, *go*; Wogul, *g*, Aino, *ki*, *gi* (plural; Lapp., *k*, *h* plural), Magyar, *k* (plural); and in Inniut, *k*; Aleut., *kek*; Mack. River, *ek*, *ik*, *eik*, *ok*, *uk*, *ak*, etc. Jukagir, *g*, *k*, *ch* (plural); Corean, *chai* (plur.).

The suffix of the plural is in Finnish, *t*, in Vepse, *d*, in Esthonian, *d*, in Mordwin, *t*, in Ostiak, *t*, *et*, Samoiede-Ostiak, *t*, Mongol, *ut*, *od*, Mandchu, *ta*, *te*, Buriat, *ut*, Innuit, *t*, Mack. River, *at*, *uit*, etc.

In Yurak the suffix of the second person singular is *n*, in Tawgy and Jakut, *ng*, in Tchiglit (Mack. R.), *n*, *an*, *in*, *en*; the suffix of the third pers. sing. in Yurak is *jea*, in Ostiak-Samoiede, *i*, in Jakut *a*, in Turkish, *i*, in Tchiglit, it is *a*. A suffix of the first pers. sing. is in Ost.-Sam., *k*, in Tchligit, *agu*. With regard to possessive suffixes we find, second pers. sing., in Tawgy, *nu*, in Jurak, *n*, in Yeneseian, *no*, in Kamass, *nan*, in Ostiak and Wogul *n*, in Jakut and Turkish, *n*, and in Tchiglit, *n*, *an*, *in*, *en*; third pers. sing., in Ost.-Sam., *t*, *d*, in Kamass., *t*, Ostiak, *t*, in Tchiglit, *at*; first person plural, in Ostiak, *et*, Tchiglit, *at*, *ait*, Wogul, *oo*, Ost., *u*, *uch*, Tchiglit, *aiout*. In the verb we find the pronoun, suffix of the first per. sing., in Kott. *n*, *an*, in Tchiglit, *una*, Mordwin, *n*. Third pers. plu., Finn, Mordwin, Tcheremish, Wogul, *t*, *iht*, Tchiglit, *ut*, *eit*, *oat*, etc.

In the declension of nouns besides the dual and plural already enumerated, the following resemblances are apparent. An accusative ending in Wogul, is *me*, in Tcheremish, *m*, in Tchiglit, *mik*; a locative in Finnish in *na*, Tchiglit, *ne*; a genitive in Buriat in *um*, Tchiglit, *m*; a locative in Japanese, *ni*, Tchiglit, *ne*, *ni*; genitive in Finnish in *n*, Samoied, *n*, Tchiglit, *m*, etc.

These grammatical resemblances and the large number of words common to the two groups of language, form, I think, a reasonable ground for the advancement of the views I have set forth elsewhere, as well as in this paper, as to the relations which exist between the languages of the Arctic tribes of America and those of the so-called Turanians of Northern Asia.

THE GEOLOGICAL FORMATION AT PORT COLBORNE, AS SHOWN BY DRILLING FOR NATURAL GAS.

By John C. McRae, Port Colborne.

Commencing at a spot twelve feet above Lake Erie level, the following strata were penetrated by the drill :—

Corniferous.	1 to 12 feet..	Drift.
	12 to 25 “ ..	Corniferous limestone.
	25 to 32 “ ..	Onondaga limestone.
Lower Helderberg.	32 to 35 “ ..	Fair cement rock.
Salina.....	35 to 52 “ ..	Shale and cement rock.
	52 to 60 “ ..	Dark shale.
	60 to 90 “ ..	Shale and cement rock.
	90 to 100 “ ..	Gypsum and shale.
	100 to 107 “ ..	Shale.
	107 to 147 “ ..	Gypsum and Shale.
	147 to 152 “ ..	Shale.
	152 to 180 “ ..	Shaly limestone.
	180 to 186 “ ..	Drab colored limestone.
	186 to 190 “ ..	Shaly limestone.
	190 to 302 “ ..	Gypsum and shaly limestone, with transparent particles of *selenite ?*
	302 to 500 “ ..	Magnesian limestone.
	500 to 700 “ ..	Shaly limestone.
Clinton....	700 to 720 “ ..	Clinton limestone.
	720 to 730 “ ..	Clinton shale.
Medina....	730 to 750 “ ..	Red shale, soft at first but gradually becoming harder.
	750 to 780 “ ..	Red sandstone, mottled.
	780 to 833 “ ..	Sandstone, red and white.
	833 to 1500 “ ..	Soft red shale, with bands of grey and green.

The corniferous limestone here has a dip of 15 feet to the mile, and at Fredonia, N. Y. State, 40 miles south of Port Colborne, it is not found until the drill has penetrated over 900 feet, so that further south a stronger dip prevails.

The Niagara limestone outcrops 17½ miles north of Port Colborne, and, I am informed, has a dip of about 50 feet to the mile. Accordingly we should find it at a depth of 875 feet, but we did not, as we had the Medina from 833 feet down to 1500.

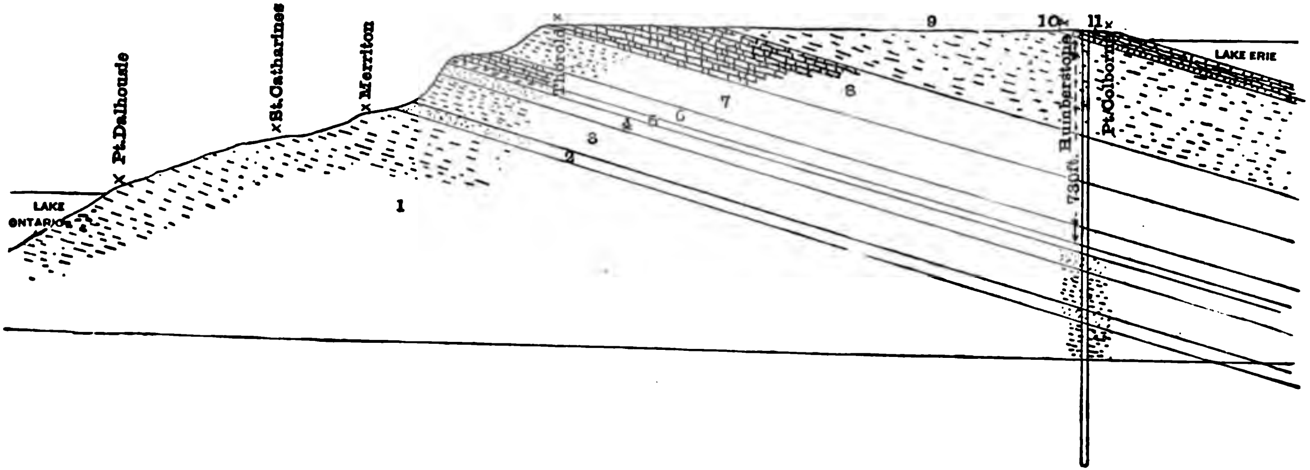
Allowing that the dip is too great, it should be found between six and seven hundred feet; but, so far, I have been unable to find limestone which could be definitely assigned to the Niagara, and it was not until the second well was drilled that I obtained any limestone characteristic of the Clinton, to which Mr. E. Orton, State Geologist of Ohio, to whom I am indebted for examining a series of samples, assigns the limestone found at 700 to 720 feet. At first not finding any limestone characteristic of the Niagara or Clinton, I thought that the whole stratum from the Lower Helderberg to 1500 feet was the Salina, and that the red shale was the lower part, but the finding of Clinton limestone shows that this was an error.

Permanent water was found at 26 feet. Salt water at 452 feet.

A fair flow of gas at 454 feet, with a strong odor of sulphuretted hydrogen.

At 764½ feet the present supply was found, which is almost odorless. The well was drilled to 1500 feet, but there was no increase in the quantity of gas. The accurate flow of the well has not been estimated, but on its being closed for seven hours, the hydraulic gauge registered 275 pounds, and was still going up. The gas is used both for light and fuel, and gives satisfaction.

NORTH AND SOUTH SECTION THROUGH THE NIAGARA PENINSULA, FROM LAKE ONTARIO TO LAKE ERIE.



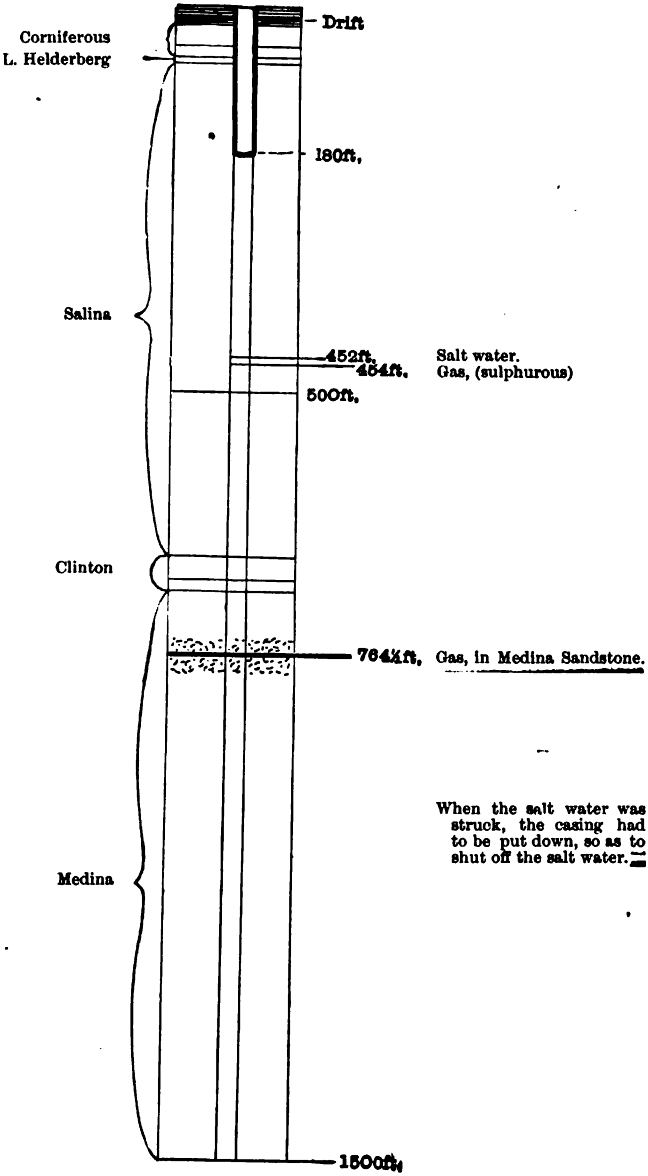
Medina { 1. Soft Red shale.
2. Light grey sandstone.
3. Alternately Red shale and Sandstone.
4. Grey and mottled sandstone.

Clinton { 5. Shale.
6. Limestone.

Niagara { 7. Shale.
8. Limestone.

9. Salina.
10. L. Helderberg.
11. Corniferous.

SECTION OF No. 1 WELL AT PT. COLBORNE.



When the salt water was struck, the casing had to be put down, so as to shut off the salt water.

INDEX OF AUTHORS.

PAGE
Browning, T. B., M.A 24, 42, 181
Carpmael, Charles, M. A. 53
Chamberlain, A. F., B.A 8, 25, 46, 261
Dobson, Charles M., M.E 22
Douglass, W. A., B.A 27, 40
Elvins, Andrew 24
Fitzgerald, Gerald 39
Garden, J. F 17
Garnier, Dr. J. H 2
Gilbert, G. R. 2
Hale, Horatio 43, 92
Houston, W. M.A 33, 40
Laidlaw, G. E 31
Lawson, George, Ph.D., LL.D 31, 196
Levey, Charles 29
Livingston, J. A 32
Merritt, W. H., F.G.S 21
Macdougall, Alan, M. Inst. C.E 27
McLean, Rev. John, M.A 40, 231
McRae, John C 46, 338
Neilson Hugh 20
O'Sullivan, D. A., D.C,L 6, 254
Panton, Prof. J. Hoyes 24, 244
Payne, F. F 26, 213
Piper, Harry 39
Rae, G. M 43
Richardson, C. Gordon 17
Rosebrugh, Dr. A. M 14
Ryerson, G. S., M.D., L.R.C.S., Edin 18
Spence, David 45, 238
Spencer, J. W., M.A., Ph.D 31
Squair, J., B.A 161
Stupart, Capt., R.N 44
Tyrrell, J. B., B.A., F.G.S 31, 40, 66, 135
Wright, Prof. R. Ramsay 10

INDEX TO PAPERS, &c.

Page.
Advances, Recent, in Telegraphy and Telephony 20
Alcohol, Influence of, on Vision 18
Annual Report, Thirty-ninth 53
Apparatus, Electro-Therapeutic 14
Balsam Lake. Indian Relics from 31
Beach, the Iroquois 31
Blackfoot Sun Dance 40, 231
Canada, Experiments in Governing 6, 254
Canada, Mammalia of 40, 66
Canada, Mining Industries of 21
Canadian Species of Picea 31, 160
Capital 29
Catawba Language 25
Caves at Rockwood 24, 244
Chamberlain Treaty, 1888 42
Chart, Elocutionary 181
Compass, Scandinavian Knowledge of 44
Creation 32
David Thompson 31, 135
Development of Language 43, 92
Economics, Study of 27
Economy, Scheme of Political 40
Electro-Mercurial Amalgamation 22
Electro-Therapeutic Apparatus 14
Elocutionary Drill Chart 181
Eskimo of Hudson's Straits 26, 213
Eskimo Race and Language 8, 261
Experiments in Governing Canada 6, 254
Franco-Canadian Dialect 161
French, Recent, Investigations on Hypnotism 10
Gaelic Language, Peculiarities of 45, 238
Geological Formation at Port Colborne 46, 338
Henry George Movement 33
Hudson's Strait, Eskimo of 26, 213
Hypnotism 10
Indian Relics 31
Individualism 21
Influence of Tobacco and Alcohol on Vision 18
Iroquois Beach 31

Lake Ontario, Water Temperatures of 27
Language, Development of 43, 92
Maize and its Derivatives 17
Mammalia of Canada 40, 66
Mining Industries of Canada 21
Miracles 39
Mississauga Language 46
Notes on Zoology 39
Old Shore Lines in the Ontario Basin 2
Outburst of Sun Spots in 1887 24
Peculiarities of the Gaelic Language 45, 238
Picea, Canadian Species of 31, 169
Pioneer Geographer of the Northwest 31, 135
Political Economy, Scheme of 40
Political Science and Practical Politics 40
Port Colborne, Geological Formation at 46, 338
Pot-holes at Rockwood 24, 244
Precious Metals, Amalgamatlon of 22
Recent Advances in Telegraphy and Telephony 20
Recent French Investigations on Hypnotism 10
Relation between Political Science and Practical Politics 40
Report, Thirty-ninth Annual 53
Rockwood, Caves and Pot-holes at 24, 224
Scandinavian Knowledge of the Compass 44
Scheme of Political Economy 40
Scientific Aspect of the Henry George Movement 33
Shore Lines, Old, in the Ontario Basin 2
Should the Privilege of Making Wills be Restricted? 43
Snake Poisons 2
Sociological Circular 62
Spruce Firs, Canadian Species of 31, 169
Study of Economics 27
Study of the Franco-Canadian Dialect 161
Sun Dance, Blackfoot 40, 231
Sun Spots, Outbnrst of, in 1887 24
Telegraphy and Telephony 20
Teredo Navalis 17
Thirty-ninth Annual Report 53
Thompson, David 31, 135
Tobacco, Influence of, on Vision 18
Water Temperatures of Lake Ontario 27
Wills, Privilege of Making 43
Whence did the Scandinavians Obtain their Knowledge of the Compass ?.. 44
Zoology, Notes on 49

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—28.

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Feuille des Jeunes Naturalistes	"	
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"Indian Antiquary"	Bombay.	
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TOTAL...................... 435.

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OCTOBER, 1887.

Whole No. Vol. XXII.] [No. 148.

CONTENTS:

Page.
FIRST MEETING, 6th November, 1886 ... 1
CONVERSAZIONE, 12th November, 1886.—President's Address ... 2
SECOND MEETING, 18th November 1886, 12.—1. Physiology and Psychology. W. F. W. Creelman, B.A., 14.—2. Indian Mortuary Customs. Rev. John McLean, B.A. ... 20
THIRD MEETING, 20th November, 1886, 24.—1. Sociology. W. Houston, M.A., 25.—2. A New Planimeter. C. Fessenden, B.A. ... 27
FOURTH MEETING, 27th November, 1886, 30.—1. Canadian Apatite. F. T. Shutt, M.A., 30.—2. Reichert's Distillation Process. A. McGill, B.A., B.Sc., 39.—3. Tannin in Spices. W. H. Ellis, M.A., M.B. ... 44
FIFTH MEETING, 4th December, 1886, 44.—1. Jurisprudence of Insanity. D. A. O'Sullivan, D.C.L., 44.—2. Blowpipe Analysis. H. R. Wood, B.A ... 56
SIXTH MEETING, 11th December, 1886, 57.—1. American Languages. A. F. Chamberlain, B.A., 57.—2. Language of Brittany. Rev. Dr. McNish ... 76
SEVENTH MEETING, 18th December, 1886, 84.—1. The Etruscan Question. Rev. Prof. Ferguson, 84.—2. Eskimo Numerals ... 105
EIGHTH MEETING, 8th January, 1887, 105.—1. The Corra. A. Gorgenyi, 105.—2. Duplex Telephony. Dr. Rosebrugh, 106.—3. Barometric Pressures. R. F. Stupart ... 111
NINTH MEETING, 15th January, 1887, 111.—1. Mammals and Birds of Prince of Wales Sound. F. F. Payne, 111.—2. Natural Waters of Ontario. Dr. Ellis ... 123
TENTH MEETING, 22nd January, 1887, 124.—1. Stone Implements from Lake St. John. Dr. Wilson, 124.—2. Theories of Heredity. A. B. Macallum, B.A. ... 124
ELEVENTH MEETING, 29th January, 1887, 124.—1. Geology in the Public Schools. J. T. B. Ives, F.G.S., 125.—2. The Eugubine Tables. Prof. Campbell ... 129
TWELFTH MEETING, 5th February, 1887, 130.—1. The Quichua Language. Prof. Dunlop, 130.—2. The Alaskan Boundary. T. B. Browning, M.A. ... 132
THIRTEENTH MEETING, 12th February, 1887, 132.—1. Canada in Sculpture. Dr. Scadding, 132.—2. Dextrine-Maltose in Beer Worts. C. Gordon Richardson ... 133
FOURTEENTH MEETING, 19th February, 1887, 135.—1. Antagonisms in Social Forces. W. A. Douglas, B.A., 136.—2. Prevention of Cruelty. J. J. Kelso ... 142
FIFTEENTH MEETING, 26th February, 1887, 144.—1. Prehistoric Ethnology. A. F. Chamberlain, B.A., 144.—2. Geology of Mount Greylock. Prof. T. Nelson Dale ... 145
SIXTEENTH MEETING, 5th March, 1887, 145.—1. Centrifugal Forces of the Planets. John Phillips, 145.—2. Notes on Astronomy. J. A. Livingston ... 145
SEVENTEENTH MEETING, 12th March, 1887, 146.—Some Pathological Growths. A. B. Macallum, B.A. ... 146

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SCIENCE, LITERATURE AND HISTORY.

APRIL, 1888.

Whole No. Vol. XXIII.] [No. 149

CONTENTS:

PAGE.

EIGHTEENTH MEETING, 19th March, 1887.—1. Huron Missions. Father Laboureau, 149. 2. Diphtheria. Dr. P. H. Bryce 149

NINETEENTH MEETING, 26th March, 1887.—Geology of Medicine Hat, J. H. Panton, M. A. 150

TWENTIETH MEETING, 2nd April, 1887.—1. Volumetric System in Materia Medica. Dr. Nesbitt, 163.—2. Study of Language. C. H. Tout 163

TWENTY-FIRST MEETING, 9th April, 1887.—1. Diabase Dykes of Rainy Lake. A. C. Lawson, M.A., 173.—2. Iron and Other Ores of Ontario. J. T. B. Ives, F.G.S., 185.—3. Origin of Haemoglobin. A. B. Macallum 192

TWENTY-SECOND MEETING, 16th April, 1887.—1. Photographing the Living Fundus Oculi. Dr. Rosebrugh, 192.—2. Bragh or Stone Flour Mill. Sheriff McKellar 193

TWENTY-THIRD MEETING, 23rd April, 1887.—1. Canadian Woodpeckers. J. B. Williams, 193.—2. Fortuitous Events. D. C. Sullivan, LL.B. 178

TWENTY-FOURTH MEETING, 30th April, 1887.—1. Experiments in Probabilities. A. Baker, M.A., 194.—2. Manufacture of Paper. John Notman 197

THIRTY-EIGHTH ANNUAL MEETING.—1. Reports of Sections, 203.—2. Annual Report.—3. Tartaric Acid in Admixtures. A. McGill, B.A., 212.—Coleoptera of Kicking Horse Pass. Bruce Bailey, 213.—Indian Languages and Literature. Rev. John McLean, M.A., 215.—Umbria Capta. Rev. Dr. MacNish, 219.—Mining Industries of Canada. W. H. Merritt, F.G.S., 240.—Snake Poisons. Dr. J. H Garnier ....

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SCIENCE, LITERATURE AND HISTORY.

OCTOBER, 1888.

Whole No. Vol. XXIV.] [No. 150.

CONTENTS:

PAGE.
ABSTRACT OF PROCEEDINGS, MEETINGS 1—25 1
THIRTY-NINTH ANNUAL MEETING 46
REPORTS OF SECTIONS 47
ANNUAL REPORT 53
ELECTION OF OFFICERS 56
SOCIOLOGICAL CIRCULAR 62
MAMMALIA OF CANADA. By J. B. TYRRELL, B.A., F.G.S 66
DEVELOPMENT OF LANGUAGE. By HORATIO HALE, Esq. 92
DAVID THOMPSON. By J. B. TYRRELL, B.A., F.G.S 135
FRANCO-CANADIAN DIALECT. By J. SQUAIR, B.A 161
CANADIAN SPRUCES. By GEORGE LAWSON, PH.D., LL.D., F.R.S.C 169
ELOCUTIONARY DRILL. By T. B. BROWNING, M.A. 181

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ERRATA IN "THE DEVELOPMENT OF LANGUAGE."

Page 96, line 18; insert "and" before "issuing."
" 113, line 3 from foot; for "or" read "and."
" 118, line 6; for "*witsaia*" read "*witsaiu.*"
" 119, line 23; for "word" read "words."

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APRIL, 1889.

Whole No. Vol. XXIV.] **[No. 151.**

CONTENTS:

PAGE.
ESKIMO OF HUDSON'S STRAIT. By F. F. PAYNE, - - - - - - - - - - 213
THE BLACKFOOT SUN-DANCE. By REV. JOHN McLEAN, M.A., - - - - - 231
PECULIARITIES AND EXTERNAL RELATIONS OF THE GAELIC LANGUAGE.
By DAVID SPENCE, - - - - - - - - - - - - - - - - 238
THE CAVES AND POTHOLES AT ROCKWOOD. By PROF. J. HOYES PANTON, 244
EXPERIMENTS IN GOVERNING CANADA. By D. A. O'SULLIVAN, D.C.L., - - 254
THE ESKIMO RACE AND LANGUAGE. By. A. F. CHAMBERLAIN, B.A, - - - 261
GEOLOGICAL FORMATION AT PORT COLBORNE. By JOHN C. McRAE, - - - 338

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